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LOCOMOTIVES AND CARS
JANUARY 1961

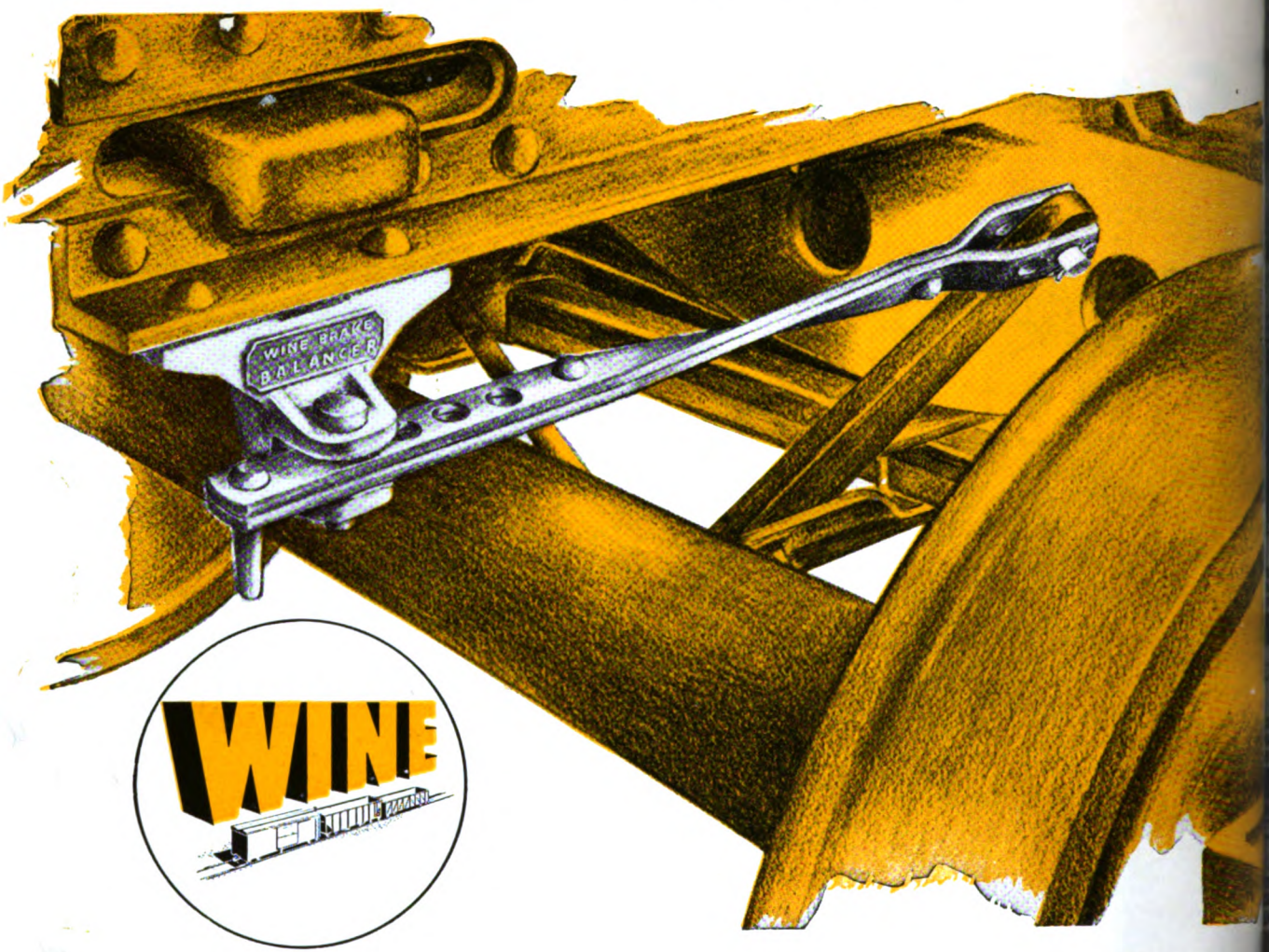


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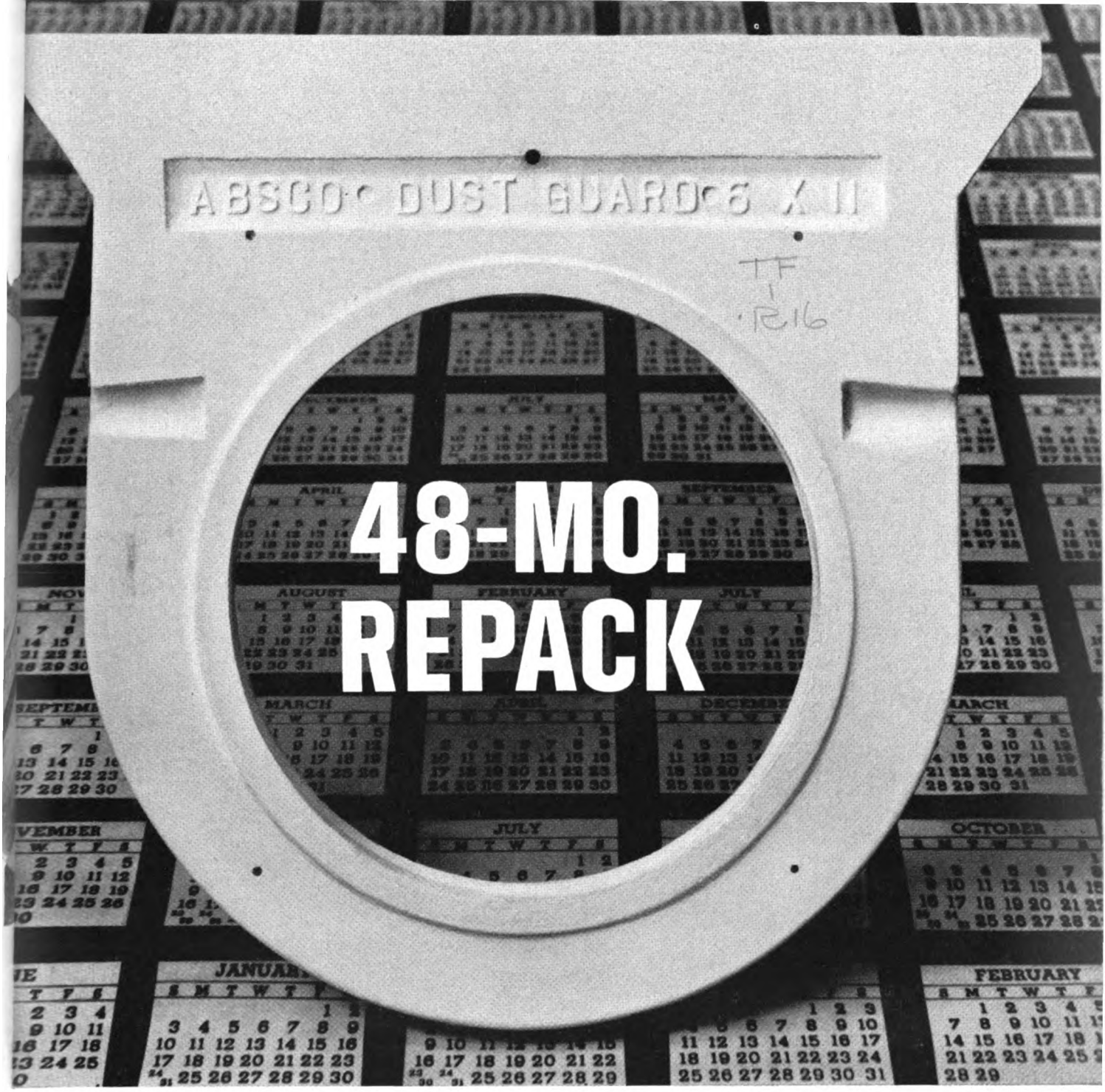
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REPORT FOR JANUARY





W. M. Keller (left), AAR vice-president and new chairman of the ASME Railroad Division, tells of the progress made by Russion railroads. H. L. Decker, PRR mechanical engineer, describes the design work and tests which produced the 85-ft Trailer Train piggyback cars.

Gangewere Tells ASME of Reading's "Operation Bootstrap"

Intense competition and a tight economy make it necessary for railroads to establish programs to enlist employees' support, E. P. Gangewere, Reading president, told the annual luncheon of the Railroad Division, American Society of Mechanical Engineers, on December 2 in New York.

Mr. Gangewere told how the Reading secures its employees' backing through a program called "Operation Bootstrap." This program starts, he said, with the "basic premise that, despite some of the differences we sometimes have with our labor organizations, we have infinitely more things in common than those that draw us apart.

"We ask for help and, naturally, we want new business, but we want to make it clear that our company is a business in which management and employees have a real stake."

At the luncheon, Mr. Gangewere; R. L. Wilson, vice-president, engineering, American Brake Shoe Co. and chairman of the Railroad Division, and H. L. Decker, mechanical engineer, Pennsylvania, were honored by being made Fellows of the ASME. The new chairman of the Railroad Division —W. M. Keller, vice-president research AAR—told of technical developments observed on the Russian railroads during his 6,500-mile trip through the USSR as a member of the U.S. exchange delegation (RL&C, September 1960, p 9). Progress in the field of railroad mechanical engineering is substantial, Mr. Keller reported. The rail equipment, while not up to United States standards, is improving, notably through the use of four- and six-wheel trucks, automatic couplers, automatic air brakes, and larger capacity cars. Electrification and dieselization are progressing.

Mr. Keller paid particular attention to the education and research programs. This work is extensive, but much of the training is to improve craftsmanship in the railroad arts. Extensive education of the formal type was also observed, but there was no evidence of superiority over the same kind of education in the United States.

"The advances in Soviet mechanical engineering show strong evidences of having been achieved by close attention to foreign railroad equipment developments, notably those in the United States," Mr. Keller concluded. "The Soviet government is not sparing manpower, money, or laboratory equipment to promote research and development for railroading. The program is more extensive than that of any other single railroad system. However, the success of any

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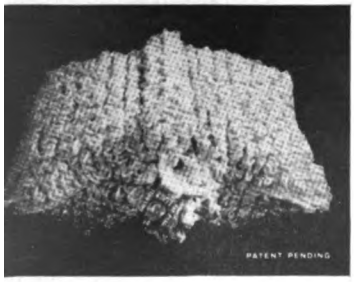


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Nowicki, Nicholas J., Dec 50
Nubbard, James S., Nov 43

O

Oakey, J. L., Mar 43
Oakley, J. W., Oct 8
Oberkamp, L. P., Mar 43
O'Connor, W. L., May 38
Oliver, P. R., May 38
O'Neill, J. D., July 54
Ozbun, L. E., Mar 43

P

Packer, Gordon F., May 39
Page, Clemson N., Jan 49
Page, J. L., Mar 42
Palumbo, Joe, Aug 39
Paradis, J. B., Mar 42
Park, Howard F., Jr., Jan 49
Parker, William K., Apr 48
Parrish, J. A., Apr 49
Passani, Robert J., Oct 48
Passur, N. A., Mar 43; July 28*
Patton, G. F., Mar 43
Payne, B. J., Jan 47
Payne, Murray C., Sept 86
Payne, S. A., May 37
Pedrick, A. S., Mar 43
Peters, F. A., Mar 42
Peterson, E. H., Nov 45
Peterson, Stephen G., Apr 50
Petterson, L. N., Sept 86
Phillips, W. D., Mar 42
Pierce, Fredrick C., Jr., May 38
Piggott, W. D., Mar 42
Pilcher, Robert M., Jan 47*
Poe, G. G., Jan 48
Pogue, Walter H., Oct 47
Pond, C. E., June 28*; July 28*
Pope, W. Arthur, Aug 39
Porter, F. H., Mar 43
Preece, W. L., Mar 43
Price, E. L., Jan 47
Price, H. L., Oct 18*
Primm, W. P., Nov 10
Prosswimmer, Paul, June 47
Purdie, J. E., Feb 44

Q

Quaney, D. L., May 38; June 46

R

Raby, J. J., Aug 39
Rainey, Hartwell T., Jr., Jan 47
Readman, Norman, Sept 86
Reed, Winthrop B., Jan 49
Regan, Bert J., May 38
Rentz, Jay D., Oct 8
Rice, P. B., May 38
Richards, Edwin T., Apr 49
Richmond, S. L., May 39
Richter, A. A., Sept 86
Ritter, Andrew J., Apr 49
Robinson, R. L., Jan 48
Roddewig, C. M., Oct 16*
Rollings, William C., May 38
Ronan, J. W., Mar 43
Rose, Robert C., Apr 48
Ross, Leonard C., Dec 50
Ross, W. D., Mar 42
Rudolph, C., May 37
Russell, Frank E., Mar 43; Nov 43; Dec 6*
Ruth, Carl C., Mar 43
Rykoskey, F. B., Apr 48; June 28*

S

Sanders, E. G., Sept 86
Sands, J. V., July 54
Santillan Medina, Rafael A., Oct 8
Sauve, J. E., Mar 42
Scherer, A. T., Jan 48
Schiffers, Albert, Jr., Sept 86
Schmeling, E. S., Nov 43
Schmitt, C. Richard, Apr 50
Schomburg, W. H., Jr., Oct 47*
Schrock, Howard H., May 39
Schuette, L. E., Feb 44
Schulte, A. J., July 28*
Seaholm, Lawrence R., Sept 7
Selby, Kenneth L., Nov 43
Selfe, Ralph G., Apr 49
Seniff, R. W., Apr 48
Setzekorn, Raymond G., Aug 39
Shepard, Donald L., Dec 6
Sherman, Robert A., Nov 44*
Sherrier, T. V., June 46
Sherwood, Edward J., Aug 40
Shryock, Donald E., Feb 44
Simpson, Robert M., Apr 49
Simpson, W. W., Aug 39
Sims, John, May 38
Slooser, A. J., Jan 48
Small, William T., Aug 39
Smerke, Frank A., Dec 6
Smith, James A. W., Apr 49
Spafford, E. S., June 46
Spannring, R. W., Aug 39
Speicher, W., Mar 44
Spencer, H. R., June 46
Spoor, D. D., Jan 48
Stark, C. A., June 46
Starr, Paul D., Jan 47
Stauter, P. W., Apr 48
Steinbrink, Carl F., Sept 86
Stengle, F. H., Mar 43
Steudel, Arthur W., Jan 48
Stevens, B. L., May 37
Stevenson, Mellor W., Nov 43
Steward, Sanford, June 47
Stone, Russell D., Apr 49
Storey, H. C., Jan 47
Stueven, John A., Aug 40
Sussens, E., Mar 42
Sutherland, J., Mar 43
Swain, M. L., June 46
Swann, James S., Jan 49
Swanson, Donald A., Jan 47
Swanson, Ray W., Mar 43

T

Tausch, Richard G., Sept 7
Taylor, A. E., Mar 42
Taylor, Charles A., Dec 50
Tenny, Allen R., Sept 86
Thomas, C. A., Oct 8; Nov 42
Thompson, R. M., Jan 48
Thompson, T. M., June 47
Timmis, Thomas W., Feb 44
Tolan, Frank W., Jan 49
Trotier, L. P., Mar 42
Tuck, E. F., July 24*
Turner, A. R., Mar 42
Turner, Ned B., Apr 50
Tyler, E. R., Aug 39

U

Upton, A. Joe, Sept 86
Upton, F. A., Oct 8

V

Vachon, J. H., Mar 42
Van Geldern, Martin, Oct 8
Veasman, Frank K., Feb 44
Veenis, R. M., Mar 42
Veith, A. L., Jan 47
Venrich, Charles F., Apr 50
Volkmer, W. D., Mar 43
vonOhlen, Floyd E., July 56

W

Walcher, E. A., Jr., Mar 44
Waldis, S. E., Mar 43
Wallace, David W., Feb 44
Warnock, Ernest J., Nov 44
Warren, D. A., May 39
Weatherall, W. J., Feb 44
Weiss, Francis A., Feb 44
Welsch, J. A., June 28*
Werner, Edwin H., Sept 7
Wetherill, Robert, III, Jan 43
Whistler, C. W., July 28*
White, Russell S., Sept 7
Whitlock, Fred C., May 38
Wiggins, C. N., Feb 44; Oct
Wilcox, George L., Apr 50
Wiles, Guy F., Nov 42
Willaman, P. O., July 55*
Williams, Bruce R., July 55
Williams, S. L., July 55*
Wilson, John J., Nov 43
Wilson, R. L., Jan 5
Wingfield, H. L., Jan 48
Witt, J. R., Oct 8
Wittman, H. W., Mar 43
Wolfe, Marvin W., June 47
Wonderly, Don T., June 47
Wood, D. B., June 48
Wood, H. M., July 28*
Woods, G. L., Oct 8
Wright, Dahrl, Feb 44
Wright, E. H., Dec 6
Wynne, Eric, Feb 43; June

Y

Yahnke, Clyde M., May 38
Ylvisaker, William T., Aug
Yonge, Jackson B., Aug 39
Young, C., Mar 42
Young, D., Mar 42

Z

Zabriskie, F. N., Apr 50
Zeider, G. L., June 46

OBITUARY

Atkinson, J. W., Mar 43
Billau, Lewis S., June 46
Brossart, John A., Dec 6
Carlile, Frank S., May 39
Clark, Orlin H., Sept 86
Cralley, John T., Apr 50
Crossett, James W., July 56
Dixon John E., Apr 50
George, Leo B., Oct 8
Kroger, Arthur M., Oct 8
Leppla, A. F., Nov 43
McCartney, James F., Nov 45
Messimer, Ward N., June 48
Morrison, Raymond L., June 48
Nystrom, Karl F., July 54
Oviatt, Harry C., May 38
Peterson, Arnold G., Apr 50
Rhoads, J. C., Mar 44
Tatum, John J., May 38
Tucker, Wallace M., Sept
Vogel, David R., Oct 48
Witten, H. A., Apr 48
Wotherspoon, A., Apr 49
Wrausmann, Elmer C., Dec

rogram must be measured by results. ompared to the United States, the USSR still behind, but progress is being made."

Chesapeake & Ohio Railvans are now ioving mail and express between Detroit, irand Rapids, and Muskegon, Mich. These ombination rail and highway trailers, uner development since 1952 and in revenue ervice since early 1959, were discussed by i. J. Sennhauser, development engineer, in ie C&O research department. The road ow owns eight of these vehicles and has perated all of them coupled together in a ngle train.

The trailer, equipped both with conventional highway wheels and a special single-xle railway truck either of which can be ositioned by an air-actuated mechanism, is esigned for operation in trains of 200 Railans. Currently, they are operated at the ear of passenger trains behind a special dapter truck equipped both with the regur railroad coupler and the special Railvan oupler.

Although, at the outset of service, a umber of mechanical shortcomings arose, iost of these have been corrected. To date, ailvans have run over 500,000 miles with n availability record of over 90%. In genral, the mechanical proving phase of Railans is virtually completed. The equipment as been tested and developed to a point here it may be safely produced in production quantities. At the present time, ie C&O is conducting a market survey to est determine where additional Railvans an be most advantageously used. The Reearch Department is actively engaged in aking feasibility studies for different Railan body types and a different suspension ystem using air springs which shows promie not only of improving the riding charcteristics, but also of substantially reducig the vehicle cost.

AAR Modifies Standard Packing Iron

A modified packing iron has been recomiended by the AAR Mechanical Division s a replacement for the design shown in ig. 3, page 24, of the Lubrication Manual. as modified, the tool can still be used for djustment of waste packing. It replaces ie sharp-pointed V-blade of the standard acking iron with a slightly indented and ounded contour so as to prevent much of ie damage done to lubricating devices hen servicing journal boxes.

Compliance with the 90-day lubrication heck of cartridge type journal bearings is ressed in a recent directive of the Mehanical Division. The division has reeived reports that all of the requirements f Rule 66-B are not being generally oberved and that, as a result, some failures ave occurred. The rule reads as follows:

"Cartridge type journal bearings which ave not received periodic lubrication atention within 90 days as indicated by stenciling on the car must be checked and AAR tandard journal-box oil added where necesary to restore to maximum oil level, after hich filling plug must be properly relaced. . . ."

Ultimately, the division expects to extend ie relubrication of some of these devices, nd permission has already been granted to operate certain cars in interchange on the basis of Rule 66-B. However, the mechanical design of many of the earlier bearings in service requires that they be lubricated at 90-day intervals.

Orders and Inquiries for New Equipment

Placed Since Closing of Nov. Issue

Diesel-Electric Locomotive Orders

ILLINOIS CENTRAL. *Electro-Motive:* 1 E-9 passenger locomotive. Cost, $252,000. Part of 1961 equipment program which includes freight cars listed below.

Freight-Car Orders

DETROIT, TOLEDO & IRONTON. *Pullman-Standard:* 100 50-ton, 50-ft 6-in. box cars. Estimated cost, $1,250,000.

ERIE-LACKAWANNA. *Bethlehem Steel Corp.* 100 85-ft roller-bearing piggyback flat cars. Cost, approximately $1,500,000. Delivery began in December.

GREAT LAKES STEEL CORP. *Thrall:* 30 70-ton gondolas. Estimated cost, $250,000. For March delivery.

ILLINOIS CENTRAL. *Company shops:* 750 50-ft double-door box cars, and 731 70-ton hoppers (231 carried over from 1960). The IC's 1961 $11,000,000 equipment program includes these cars, the locomotive listed above, and the purchase of 100 70-ton covered hoppers and 25 Air-Slide cars.

MILWAUKEE. *Pullman-Standard:* 650 50-ft box cars and 100 50-ft box cars, all equipped with roller bearings, 9-ft doors and nailable steel flooring. This $7,500,000 order included in road's 1961 equipment program which also allocates $3,240,000 for improvements to existing freight and passenger equipment.

MISSOURI PACIFIC. *Company shops:* 300 50-ton, 50½-ft box cars with 9-ft doors and high-capacity draft gear; 200 50-ton, 50½-ft box cars with 9 ft doors, damage prevention devices, and nailable steel floors or equivalent; 100 70-ton, 50½-ft box cars with 9-ft doors, damage prevention devices, nailable steel floors or equivalent, and cushion underframes; 200 70-ton, two-bay steel covered hopper cars of 2,055 cu ft capacity; 50 70-ton, 53½-ft flat cars, and 250 50-ton, 50½-ft box cars with 15-ft double doors. All cars to be equipped with roller bearings.

NORTH AMERICAN CAR. *Thrall:* 35 3,500-cu ft capacity covered hopper cars. For lease to United Carbon Co., Houston, Tex.

NORTHERN PACIFIC. *General American:* 5 70-ton, 3,500-cu ft Dry-Flo covered hoppers. Delivered in December.

WESTERN PACIFIC. *Thrall:* 50 70-ton, 56-ft flat cars. $500,000 order completed in December.

Passenger-Car Orders

NEW YORK CITY TRANSIT AUTHORITY. *St. Louis Car Co.:* 60 additional subway cars. Approximate cost, $7,300,000.

TORONTO TRANSIT COMMISSION. *Montreal Locomotive Works.* 36 transit cars.

Notes and Inquiries

Louisville & Nashville. 900 general-purpose gondolas and 900 open-top hopper cars ordered from Pullman-Standard as reported in December issue, will be 70-ton cars, all equipped with roller bearings. Immediate delivery.

Rio Grande improvements program for 1961 involves $2.1-million for purchase of 150 70-ton, 2,000-cu ft capacity covered hopper cars equipped with roller bearings; acquisition of a dynamometer car and diesel engine test facility to permit continuing investigation into use of inexpensive fuels under adequate testing procedures, and improvements to existing equipment.

Land Transportation Winter General Meeting

The Land Transportation Committee of the American Institute of Electrical Engineers has prepared the following program for its Winter General Meeting which will be held in the Statler-Hilton, New York, January 31 through February 2:

TUESDAY, JANUARY 31

2 p.m.

Contact Wire Wear — K. H. Gordon, electrical research engineer, Pennsylvania.

A Justification of Railway Electrification, H. C. Cross, manager, Apparatus Parts Dept., Westinghouse Electric International Co.

Electrical Control Equipment for Disneyland Monorail Trains—J. J. Stamm, Westinghouse Electric Corp.

WEDNESDAY, FEBRUARY 1

9 a.m.

A New Concept in Diesel-Electric Locomotive Design—J. C. Aydelott, advance locomotive project engineer, General Electric Co.

Unique Features of 2,500-Hp Diesel-Electric Locomotive—J. C. Aydelott.

Senate Subway System—W. L. Rubel, architect of the Capital; W. H. Watson and R. E. Stillwagon, Westinghouse Electric Corp.

2 p.m.

Electrical and Diesel Power on Russian Railroads—J. W. Horine, electrical engineer, Pennsylvania.

Symposium on British Electrification Conference—S. V. Smith, assistant electrical engineer, Pennsylvania; H. H. Duehne, assistant mechanical engineer—electrical, New York Central; K. A. Browne, director research, Chesapeake & Ohio; J. Stair.

THURSDAY, FEBRUARY 2

9 a.m.

Epoxy Resins for Electrical Apparatus—I. H. Elbling, Westinghouse Research Laboratories.

Analog Simulation of Automatic Train Operation—R. C. Buck, General Railway Signal Co.

Maintenance and Rehabilitation of Traction Electrical Equipment—D. E. Stafford, chief engineer, National Electric Coil Co.

Letters to the Editor

"There's Always Another"

TO THE EDITOR:

I have read with some interest the editorial entitled "There's Always Another" which appeared in the October issue of Railway Locomotives and Cars and feel that I cannot let the statements made therein pass without offering some comments thereon.

The conclusion to be reached from reading your editorial is that, in going to car journal lubricators to alleviate the hot-box situation, there has been established the new problem of oil on the rails and that there is, as of now, no solution for this new problem.

During 1957, service tests were run on the Pennsylvania Railroad between Altoona and Enola during which the oil consumption on boxes equipped with seven different types of lubricators, as well as boxes packed with roll waste packing, was carefully measured with free-oil levels in the journal boxes ranging from 1 in. to 0 in. and back to 1 in. in increments of ¼ in.

(*Continued on page 45*)

Electro-Motive's GP-20 demonstrates

UNIT REDUCTION



There's no rest for the GP-20, a new 2000-hp broad range locomotive, now being demonstrated on America's railroads. Climbing ruling grades, speeding "hotshots", lugging heavy freights, GP-20's are demonstrating unit reduction—one of the major economies in Electro-Motive's Locomotive Replacement Plan. Added capacity enables three GP-20's to replace four older units.

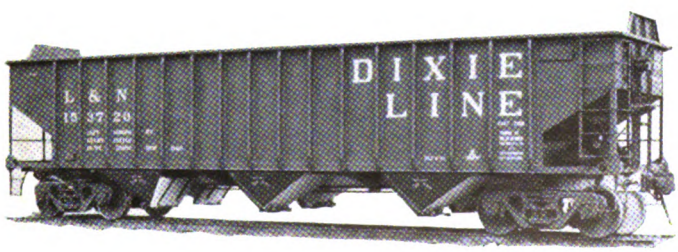
ELECTRO-MOTIVE DIVISION · GENERAL MOTORS
LA GRANGE, ILLINOIS • *HOME OF THE DIESEL LOCOMOTIVE*
In Canada: General Motors Diesel Limited, London, Ontario

GENERAL MOTORS LOCOMOTIVES



Railroads are making the "Big Switch"

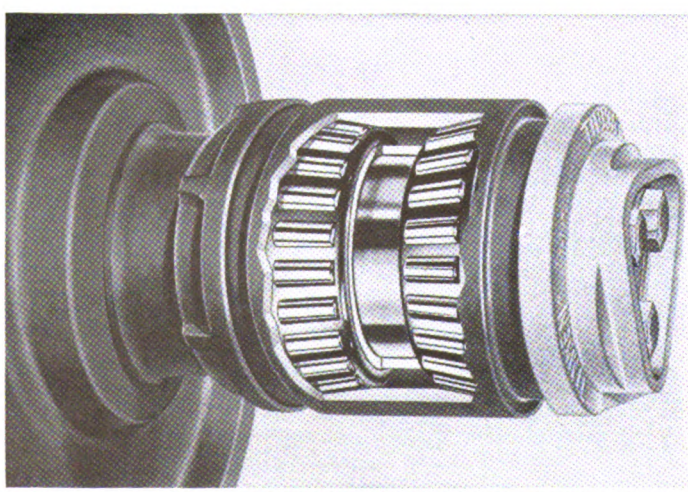
L&N PLACES SECOND BIG "ROLLER FREIGHT" ORDER...1800 more cars on Timken® bearings



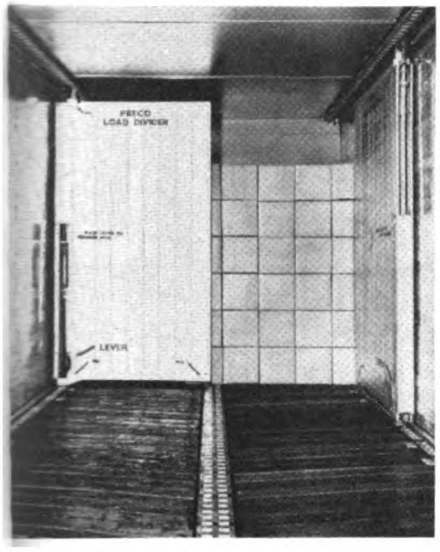
Fast on the heels of a 2700 car order, The Louisville and Nashville has ordered another 1800 cars on heavy-duty Timken® "AP" tapered roller bearings. These "Roller Freight" gondolas and hopper cars will enable the Louisville and Nashville to get high-mileage, trouble-free use of cars while increasing the return on their freight car investment. And customers will benefit from still better service.

The L&N is a leader among the 99 railroads and other freight car owners who are putting more and more steam behind the switch to "Roller Freight". At the end of 1959 there was a total of 53,000 Timken bearing-equipped cars in service or on order. And in 1960 over 16,000 cars were ordered. We are doubling the capacity of our Columbus, Ohio, plant.

Now's the time to join the switch to "Roller Freight"—the only way to solve the hot box problem. Timken bearing-equipped cars are rolling up millions of trouble-free miles between car setouts caused by overheated bearings. Timken bearing-equipped cars can operate 4 years between lubricant checks. And when all freight is "Roller Freight", the railroads will save an estimated $288,000,000 annually, about $144 per car. The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO".



heavy duty
TIMKEN®
tapered roller bearings



oad Dividers

ne man can operate the Preco dividers ow being installed in refrigerator cars, sulated box cars, and other types of eight cars. Elimination of center rail in iling gives unobstructed head room for ad and lift trucks. A single lever, operated om either side, is raised to unlock the diders for positioning. Damage to the inde of the car is avoided because the gates nnot be left in an unlocked position. The sign is said to have resulted in more than 000 lb weight reduction over units of mparable strength. *Preco Incorporated, ept. RLC, 6300 East Slauson ave., Los ngeles 22, Calif.*



Diesel Engine Barring Device

The Ajax electro-hydraulic Push-Over is designed to rotate diesel engine crankshafts for inspection of rings, pistons, and cylinder liners, or for re-set timing. It features a one-man operation with start-and-stop pushbutton control to give regular speed for fast inspections and slow speed for precise spotting on a timing mark. The device is powered with a 1-hp, 110-volt, a-c motor. The capacity of hydraulic pump and solenoid valve is 3 gpm at 500 psi. Tubing from the main unit to the pushing cylinder is mounted on an automatic hose reel. The pushing cylinder when positioned at the flywheel requires no bolts or toggles and exerts a force of 1,500 lb. The unit can also be used while doing generator work. *Ajax-Consolidated Co., Div., Southern Electric, Inc., Dept. RLC, 8701 South Greenwood ave., Chicago 19.*



Airless Spray Equipment

The Hi-Spray line of airless spray equipment is available in 10 different models, portable and stationary, for handling all types of paints, including water base. A self-contained locking devices immobilizes both wheel roll and caster swing, enabling the equipment to be used on inclined, as well as flat, surfaces. Visible pump oil supply is standard on all models.

The double-action pump and high fluid pressure at the nozzle (1,650 lb from 75 psi air pressure) make possible the use of two guns from each pump. Each gun may be operated up to 75 ft from the pump. In interior or exterior maintenance work, two gun operators, it is said, can cover more area with less paint in less time on all types of surfaces, including rough and porous. *Hi-Spray Div., Balcrank Inc., Dept. RLC, 10 Disney St., Cincinnati 9, Ohio.*

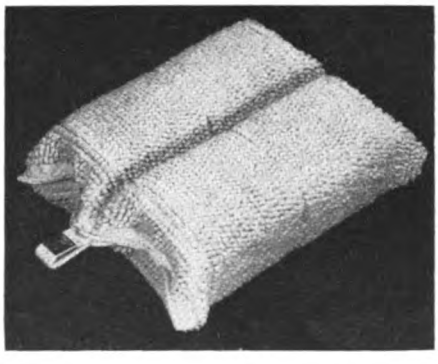
Journal Box Seal

The Oiltite journal seal is made from synthetic rubber reinforced with ⅛- x ⅜ in. flat steel inserts around the periphery and a ¼-in. diameter steel insert around the journal fit. The inside diameter of the seal is less than the outside diameter of the dust guard land of the axle to insure a tight fit. It is said to eliminate oil loss at the rear of the box, regardless of the level of free oil, and give perfect performance without journal stops, special bearings, etc. The seal is available in 5 x 9, 5½ x 10, and 6 x 11 in. sizes, and is AAR approved for 1,000 car sets in interchange. *Railway Car Equipment Co., Dept. RLC, 1400 E. Tremont st., Hillsboro, Ill.*



Polyurethane Sealant

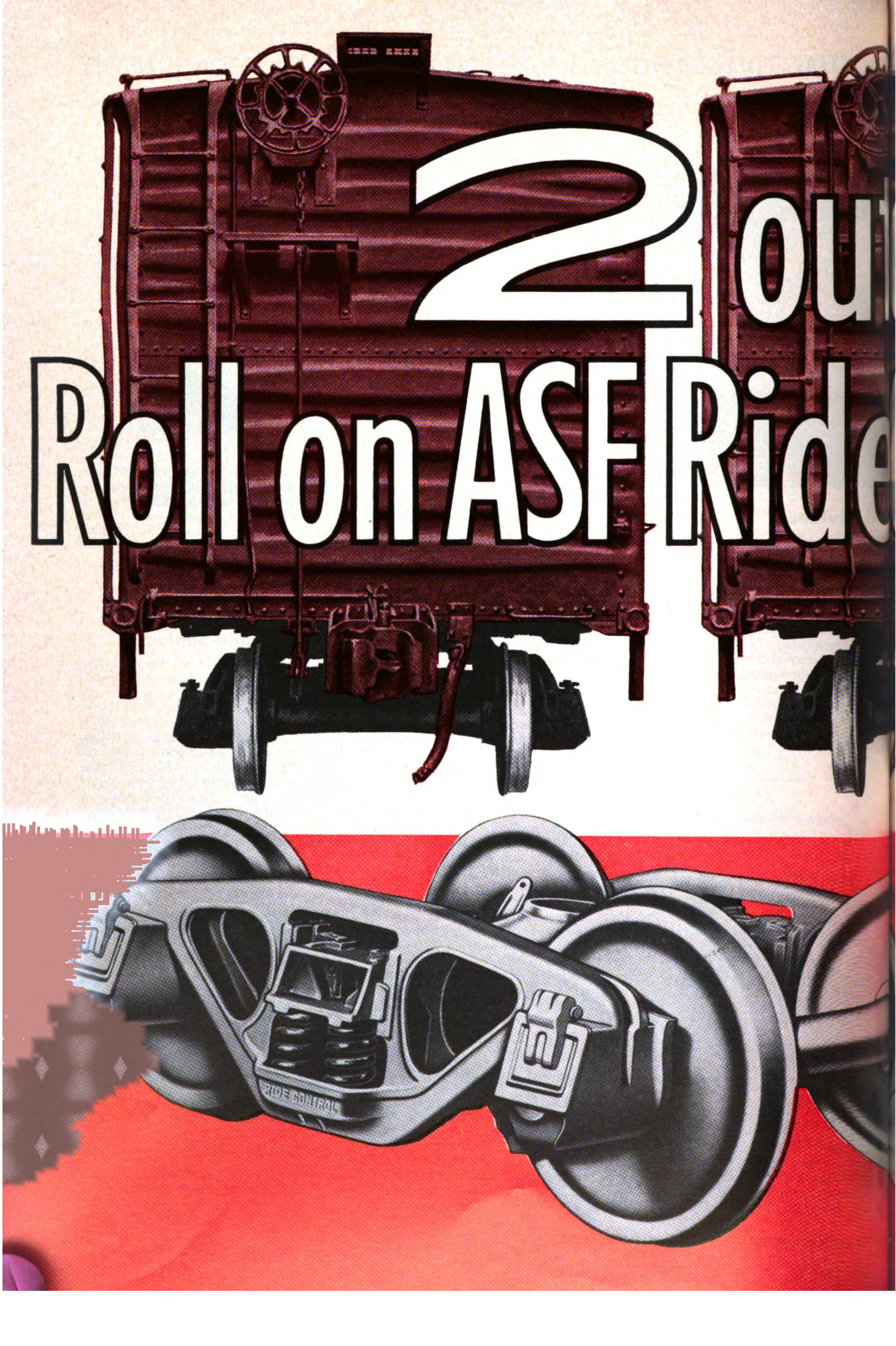
Black U. I. Sealant 829-901 is a soft, high-modulus composition which can be applied with a caulking gun or a knife. It comes in a single package, requires no field mixing or curing accelerators, and does not shrink on aging. Its adhesive properties will withstand changes in temperature within the range of minus 75 deg to 150 deg C. The sealant, it is said, will not slump or sag in vertical or overhead installations, even in joints as wide as ¾ in. *Public Relations Dept., E. I. du Pont de Nemours & Co., Dept. RLC, Wilmington, Del.*



Journal Lubricator

The Landreth-Pak twin lobe pad features an 8-in. wide wick sewed to the outer cover

(*Continued on page 45*)


2
Roll on ASF
RIDE CONTROL



For nearly twenty years, 2 out of 3 trucks put under American freight cars have been *ASF Ride Control Trucks*. This is no accident. It is the simple recognition of vital improvements engineered into these trucks by continuing research at American Steel Foundries.

ASF

Ride Control® Truck

AMERICAN STEEL FOUNDRIES

Prudential Plaza, Chicago 1, Illinois

Canadian Manufacturer and Licensee: International Equipment Co., Ltd., Montreal 1, Quebec
Other Foreign Sales: American Steel Foundries, International, S. A., Chicago

EDITORIALS

Let's Stick to Facts

Other publications, here and abroad, have been presenting claims and counter-claims by diesel-electric and diesel-hydraulic locomotive adherents. These discussions are both educational and worthwhile when authors confine themselves to engineering data and demonstrated performance facts. But when they stray into expressions of prejudiced opinion, hearsay, and unconfirmed information, such discussions can be misleading, sometimes downright harmful.

We believe that motive power must demonstrate its value by service performance. Once any motive power type can prove its superiority in hauling trains then the choice of motive power depends simply on the answer to one question: What kind of locomotive will do the best job at the lowest cost? The diesel-electric proved that it was both better and more economic than steam power. It did so because of its inherent characteristics and in spite of exaggerated claims made by some of its proponents.

The German-built diesel-hydraulic units to be delivered this year to two American railroads must prove their worth in U.S. service, too. In performance tests we are sure that these locomotives will get the best attention with every effort being made to obtain maximum performance from them. Americans abroad may be careless in spending money, but economy-minded American railroads are not investing substantial sums in any equipment without doing their utmost to obtain the greatest possible value out of each dollar spent.

Late this year we anticipate reporting the performance of the diesel-hydraulic locomotives. Until then we believe all published comments and discussions should be limited to factual data without the inclusion of unsubstantiated claims and information.

No Time to Stop

A concept which initially might seem too "egghead" for practical, hardheaded railroaders has proved to be effective in solving a lading damage problem. The article on page 36 tells how auxiliary, spring-mounted damping masses, installed in a refrigerator car, have controlled undesirable resonance and cut damage to beef which is suspended from ceiling hooks for shipment. This is the result of work done by the Canadian National mechanical and research departments. An ASME paper by W. H. Cyr, CNR chief mechanical engineer, has described the final installation and the work which led to it.

A suggestion that the dynamic vibration absorber, invented by Frahm in 1900, might have railroad applications was made by Dr. J. C. Settles, assistant chief mechanical engineer of Buckeye Steel Castings, at the ASME Railroad Division meeting in April 1958. He reported that spring-supported floor sections at the two ends of a car might, when loaded, form the necessary auxiliary damp masses. Wide variations in lading weights seemed to r out this type of arrangement. The CNR applicatio overhead meat racks, which carry relatively cons weights, has made it possible to demonstrate the practi bility of the arrangement.

Even though the CNR has shown what can be d it is important to note Mr. Cyr's conclusion: "Ther an urgent need for improvement in the riding qualitie existing freight-car trucks, particularly in the higher sp ranges, so that all fragile commodities may be protec adequately."

Something for the Computer

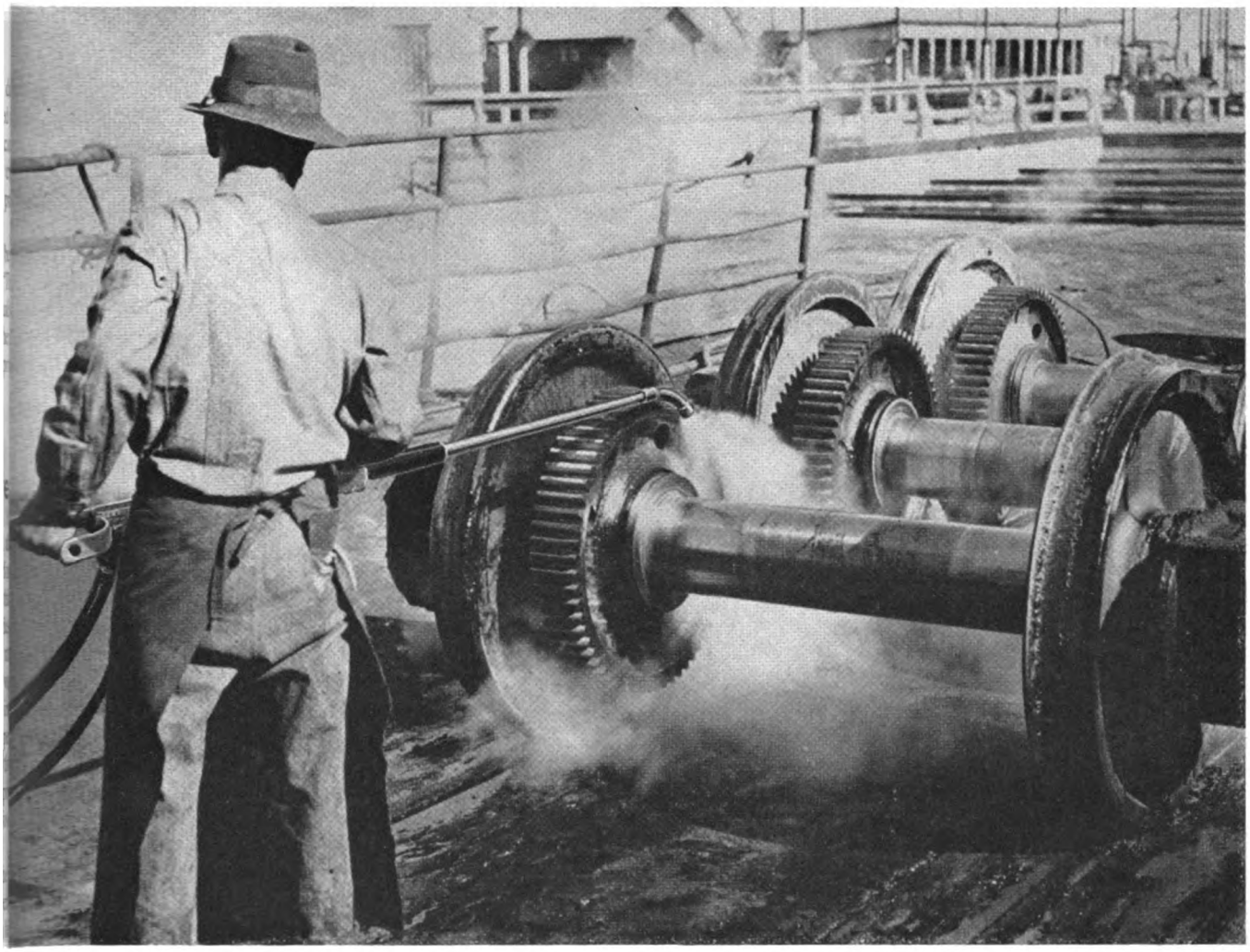
As the railroad situation continues to be bad and the lo on the reduced personnel increases, it is logical for th among the executive and supervisory forces to think hope I can last until retirement." But the same desper situation does offer a challenge. If established meth can not produce results, some new and perhaps very d ferent way out must be found. For those without imagi tion, the logical procedure is to dispense with operati which show red figures. But reducing the size of the p also reduces the possibility of making a sizable profit all comes back to the often expressed need for fourth mensional thinking.

One suggestion is offered by costs involved in the Bri electrification which is now in progress. The overall figures of 452 million dollars include 122 million for ti equipment and 116 million for signal equipment. T corresponds to American experience in which each electrification has required a change of signals which as much as the power supply equipment and cont system.

But over a period of years it is often considered de ble to make basic changes in signal systems for rea other than electrification. On one American railroad th have been three signal changes since its electrified sec was first placed in service. There may be railroad p ners who might profitably put these facts into the mem storage device of their future planning calculator.

No railroad in the U. S. is expected to launch a m electrification immediately. But necessity is resulting mergers. Should these mergers, or any other reason quire basic signal changes, it would appear that it m be well to consider possible future electrification. W practice indicates that new installations will employ c mercial frequency (60 cycles in the U.S.) with a con system voltage of 25,000. Mergers will undoubtedly e consolidation of traffic which will bring closer the when reduced costs and improved performance can effected by electric operation. If the signal systen chosen which is compatable with commercial frequ power supply, the high and possibly prohibitive co electrification might be avoided.

Oakite adds more POWER to your MANPOWER



...Hurriclean® Steam-Detergent Gun makes short work of tough cleaning jobs

POWER-UP for the hard jobs of cleaning with the Oakite Hurriclean Steam-Detergent Gun and you'll save money as well as work.

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The Oakite man or Bulletin F-8055 can tell you more. Send for either one. Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

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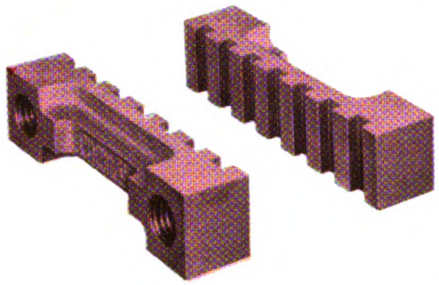
over 50 Est. 1909 SCIENCE

years' leadership in industrial cleaning

STABILIZED JOURNALS—

Now MAGNUS offers you three low-cost ways to get

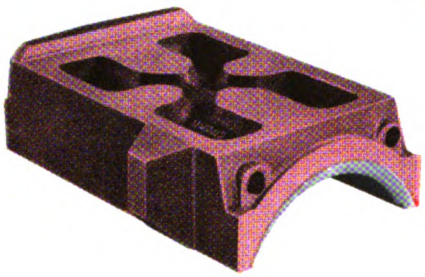
BETTER BEARING PERFORMANCE



1. MAGNUS R-S JOURNAL STOPS

Provide maximum stabilization of entire journal box assembly—increases miles per hot box ten times

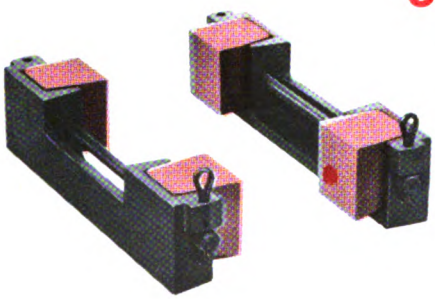
Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures—increase miles per hot box *ten times;* miles per cut journal, *fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.



2. MAGNUS FLAT-BACK SOLID BEARINGS

Wider, non-tilting design limits bearing displacement—provides effective stabilization at lower cost

The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust-guard, reduces loss of oil through enlarged dust-guard openings and tends to prevent spread linings in the bearing.



3. MAGSTOPS

Offer the inherent advantages of R-S Journal Stops in a low-cost, rugged, fabricated design

Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The next big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

MAGNUS METAL CORPORATION

Subsidiary of

NATIONAL LEAD COMPANY



Length over strikers with no underframe compression is 58 ft 3⅛ in. Inside length is 50 ft 6 in. Light weight of car is 74,400 lb.

Southern Box Cars Have New Look

Single-sheathed carbody construction and high-capacity cushion underframe are used

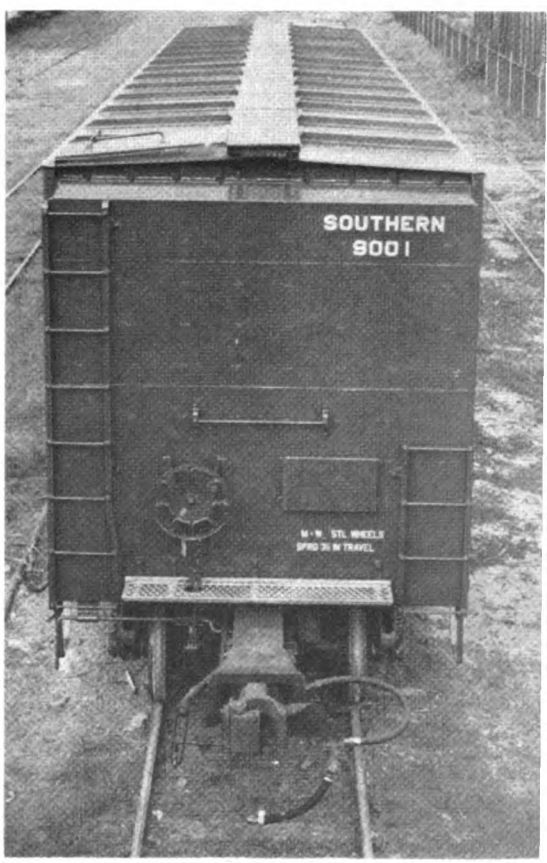
The first large order for cars incorporating the Pullman-Standard long-travel Hydroframe-60 cushion underframe has been completed. The 200 Southern all-steel, single-sheathed, 70-ton box cars, built at the P-S plant in Bessemer, Ala., are going into general merchandise service.

Cushion underframes on half the order are equipped with the P-S hydraulic cushion cylinder and, on the other half, with a Bendix hydraulic cylinder. Structural features of all the underframes are the same. Special equipment on the bodies includes Alcoa aluminum doors, Southern-designed sandwich ends, and P-S nailable steel floors. All side posts and carlines are outside, giving a smooth interior.

The stationary center sill runs the length of the car body, from end sill to end sill. The sliding center sill, built up of two welded AAR 41.2-lb Z-sections, extends through the stationary sill and allows for 30 in. cushion travel at each end of the car. The sliding sill has two slots in its webs at the center, allowing the sill to slide in either direction with the cushion keys passing through it. An angle welded along the lower edge of the slot and a strip along the upper edge compensate for loss in compressive strength resulting from these key slots. The cushion lugs are above and below the horizontal space for the cushion keys. Carbon-steel wear plates are applied along the bottom surface of the sill flanges where they are in contact with the stationary underframe cross-members. Sliding-sill stiffeners act as lateral and vertical wear plates at the crossties.

When the sliding sill is at center position, the cushion cylinder is extended, ready for impact in either direction. The cushion keys at each end of the cushion pocket bear against the cushion key back stops, which, in turn, are welded to the stationary sill. The sliding-sill cushion lugs above and below the cushion key are welded to the inner side of the sliding sill at each end of the cushion pocket. During impact, these lugs move with the sill, compressing the cushion against the opposite key.

The hydraulic cushion generates pressure by forcing oil through a controlling orifice. At the beginning of a stroke, the orifice is fully opened



Car ends are ⅛- and 3/16-in. sheets welded on both sides of 3/16-in. corrugated center.

where the small end of the tapered metering pin projects through. As the piston passes through the cylinder, the orifice is gradually closed as the metering pin fills more and more of the opening. The closure of the orifice is matched with the slowing of the piston to maintain the desired pressure. The orifice is completely closed at the last ½ in. of the stroke, so that the cushion never bottoms steel-against-steel.

There is very little difference between the Bendix and P-S cylinders. In both, the metering pin is designed to provide the most efficient compromise between light and heavy loads, and slow and fast impact speeds.

Hydraulic Cylinders

P-S uses a pre-loaded return spring to force the cushion and sliding sill back to center or neutral position. Bendix depends on a column of compressed air ahead of a floating piston. This air is compressed by a volume of oil displaced from the high-pressure oil chamber through the orifice to the low-pressure oil chamber.

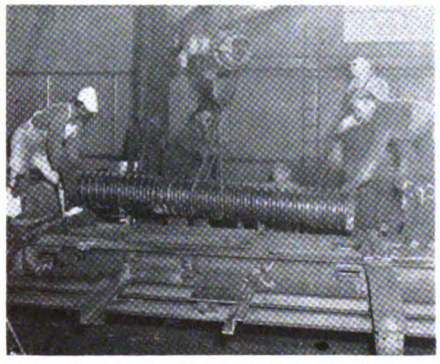
Oil passing through the control orifice in the P-S cylinder flows behind the piston and through the piston-rod ports. The piston rod sliding through the cylinder head displaces a volume of ail from the cylinder chamber. The displaced oil flows through the cylinder-head ports into a rubber "boot" which turns inside itself and fills as it receives this volume of oil. The boot is fastened to the cylinder head and piston with hose clamps. After impact, the return spring, preloaded at time of assembly, forces the cushion and the sliding sill back to neutral and the boot unfolds and collapses, forcing oil back to its original position.

Cushions are self-contained units with no oil pipes and hoses connected to them. Their energy capacity is rated in excess of 500,000 ft lb, and their ultimate capacity approaches 1,000,000 ft lb.

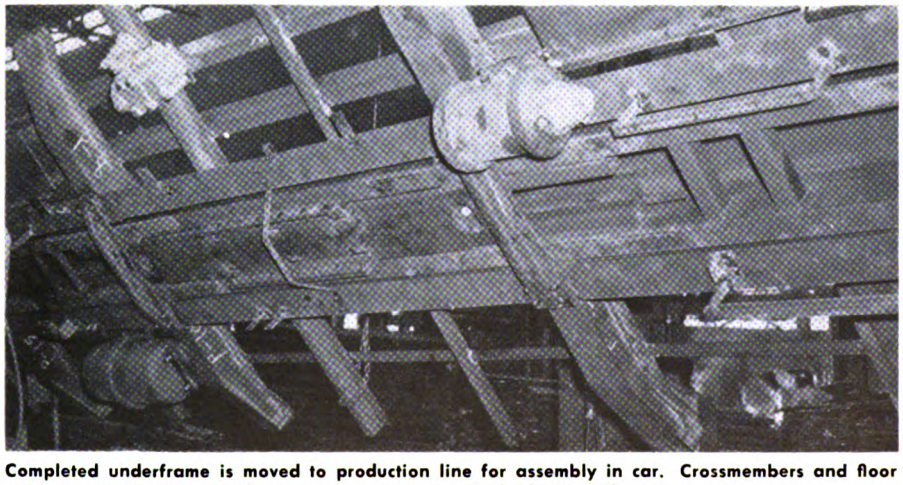
Draft-gear pockets and strikers in the sliding sill are welded and are arranged for special couplers. This is necessary because of the 8 ft 6 in. distance between truck center and striker face with sill in fully extended position. The coupler has a Type E head and Type F butt and is 43 in. long from pulling face to the center line of the Type F yoke pin butt. The king-pin housing is high-tensile cast steel integral with the body center plate.



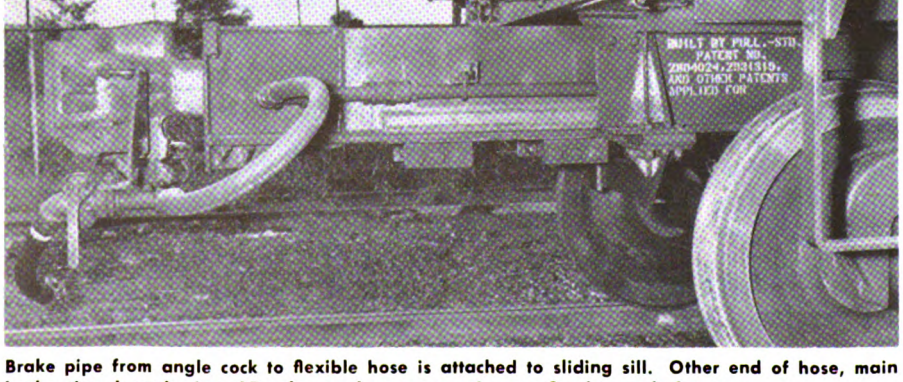
Sliding sill is assembled in underframe prior to installation of the hydraulic cylinders.



Hydraulic cylinder is lowered into underframe. This is Pullman cushion with return spring.



Completed underframe is moved to production line for assembly in car. Crossmembers and floor stringers are Cor-Ten LAHT steel or equivalent. Nailable steel floor is used.



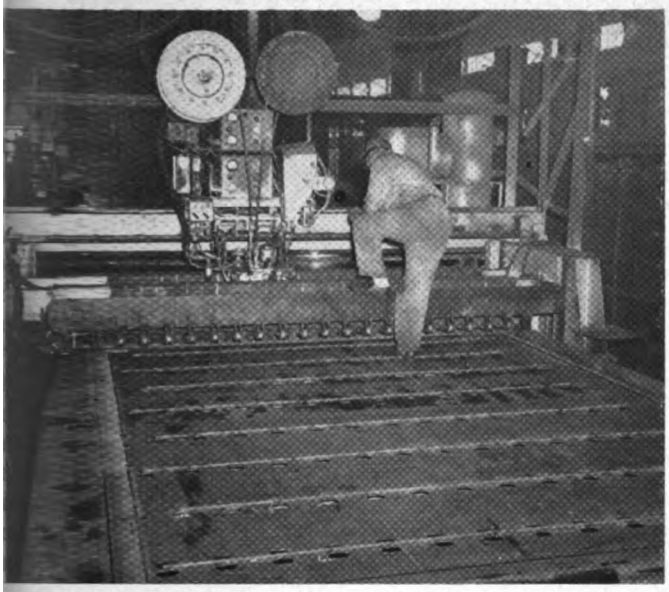
Brake pipe from angle cock to flexible hose is attached to sliding sill. Other end of hose, main brake pipe, branch pipe, AB valve, and cross-over pipe are fixed to underframe.

Underframe Details

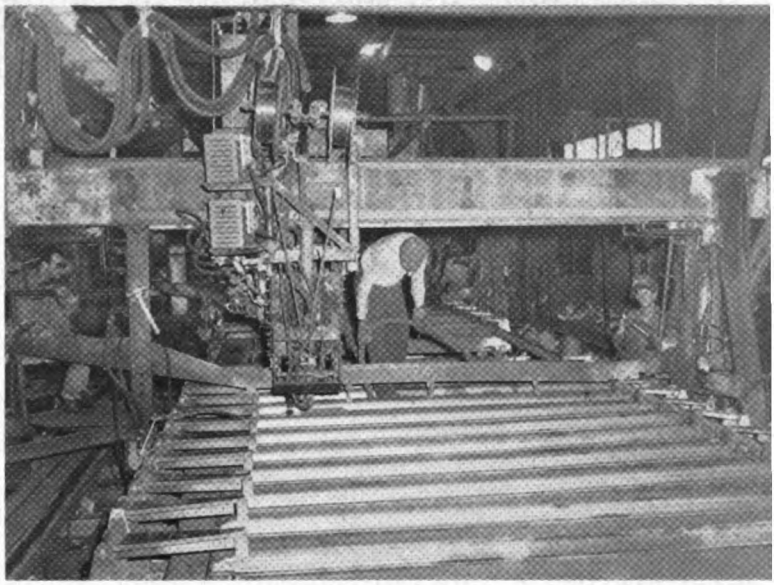
The stationary sill consists of two 41.2-lb steel AAR center-sill sections inverted so that the $13/16$-in. flange becomes the top flange of the sill. The top flanges are joined at the bolster and crossbearers by ⅜-in. top cover plates. The bottom flanges are connected at the bolsters by the body center plate and at cross-bearers by ½-in. pressed connections.

Body bolsters are a built-up design with ¼-in. web plates. Top cover plates are 21 x ⅜ in. and extend from side to side of car. The 24-x ⅜-in bottom cover plates extend from the side of car and are fastened with high-strength bolts to the stationary sill bottom flange. Side bearing braces are $5/16$ in. inverted U-pressings welded between the bolster webs.

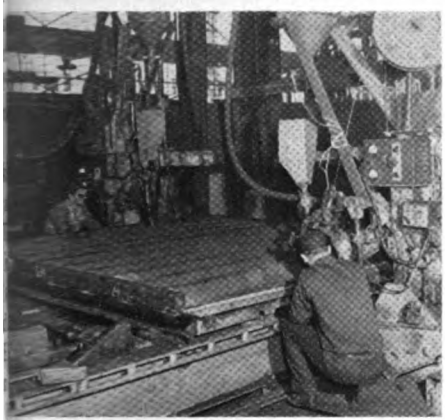
Four crossbearers per car are built-up welded construction, with $3/16$-in web plates. The 6- x $5/16$-in. top cover



Slots cut in side sheets are backed up with round bars tacked in place to form lading strap anchors. Side is completely welded.



Vertical outside side posts are welded over backs of strap anchors to form weathertight assembly. Car is a single-sheathed design.

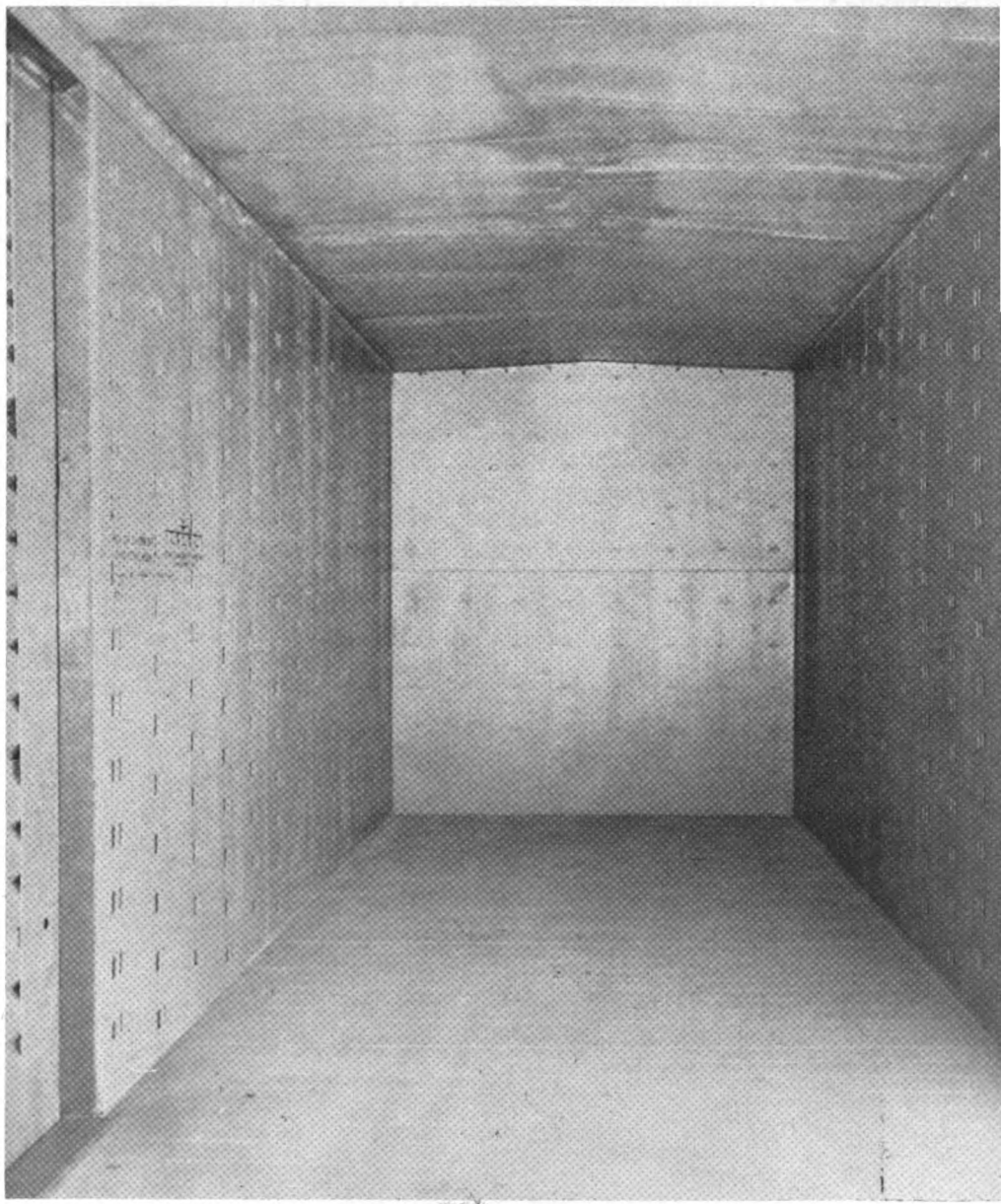


End assemblies are all welded. Completed end (left) has sheet welded over corrugated core.

plates extend from the side of car and are welded to the side of the stationary center sill. Bottom cover plates are 8 x 5/16 in., extending from the side of the car, and are bolted to the stationary sill bottom flange.

Two 3-in., 6.7-lb Z-bar floor stringers each side of center sill extend in one length between body bolsters, passing over the top of the floor beams and contoured crossbearers. Stringers are welded to the underframe crossmembers. The four floor beams are 4-in., 8.2-lb Z-bars.

Side sills are 4- x 4- x 3/8-in. rolled angles extending from end to end of car. The side plates are 4- x 3½- x 3/8-in. bulb angles, reinforced through the doorway by a 5- x 3/8-in. bar. The side sill is reinforced with a 5/16-in. pressed angle, 11 in. deep at center of the car. It extends from bolster to bolster and is welded to the bottom of the side sill. The 3/16-in. side sheets, placed inside the side plate and side sill, are automatically butt-welded to



Smooth interior is finished with neoprene-base paints. Interior width is 9 ft 4 in.; height, 10 ft 6 in. Cubic capacity is 4,949 cu ft. Cars have aluminum side doors, LAHT steel bodies.

both. Side sheets adjacent to the corner post are ¼ in. thick. Corner posts are ¼-in. plate pressed box sections. Door posts are $^5/_{16}$-in. pressed angles with a $^3/_{16}$-in. pressed hat section stiffener. The 20 side posts are $^3/_{16}$-in. pressed hat sections. There are also two 3-in., 5.1-lb-per-ft Z-bars adjacent to the corner posts on each car side. The side posts are welded on $18^1/_{16}$-in. centers. Raised portion of each hat section covers 1½- x 3-in. slots on 8-in. vertical centers which form the lading strap anchors. There are 616 of these anchors per car. A ⅝-in. round bar behind the side sheet on the center line of each side post reinforces the centers of the series of strap anchors.

The ends are a welded sandwich design, each consisting of $^3/_{16}$-in. plate with 4-in. corrugations between an inner lining of $^3/_{16}$-in. plate and an outer sheathing which is $^3/_{16}$-in. plate at bottom and ⅛ in. at top. The bottom outer sheathing is flanged to form an integral end sill. Assembled ends are welded to the corner posts and roof sheets, and riveted to the stationary center sill.

Partial List of Suppliers

Truck side frames and bolsters	American Steel Foundries Scullin Steel
Truck brake levers, bottom connections, brake-rod jaws	Schaefer Equipment
Axles	Tennessee Coal & Iron
Roller bearings	Timken Roller Bearing
Brake shoes	Walker Machine & Foundry
Draft gears; hand brake	W. H. Miner, Inc.
Couplers and yokes	American Steel Foundries
Side bearings	A. Stucki
Brake beams	Chicago Railway Equipment
Air-brake equipment; slack adjusters	Westinghouse Air Brake
Running boards and brake steps (aluminum)	Morton Manufacturing
Doors (aluminum)	Youngstown Steel Door
Defect card holder (aluminum)	Railway Devices

The flat type roof, similar to that used on covered hoppers, is a one-piece assembly of 41- x $^3/_{16}$-in. panels which are inverted and continuously welded in a jig. The 3- x 2- x ⅜-in. carlines are welded to the outside of roof at the same time the panels are welded together. The assembled roof is welded to the side top chord and top flange of the ends.

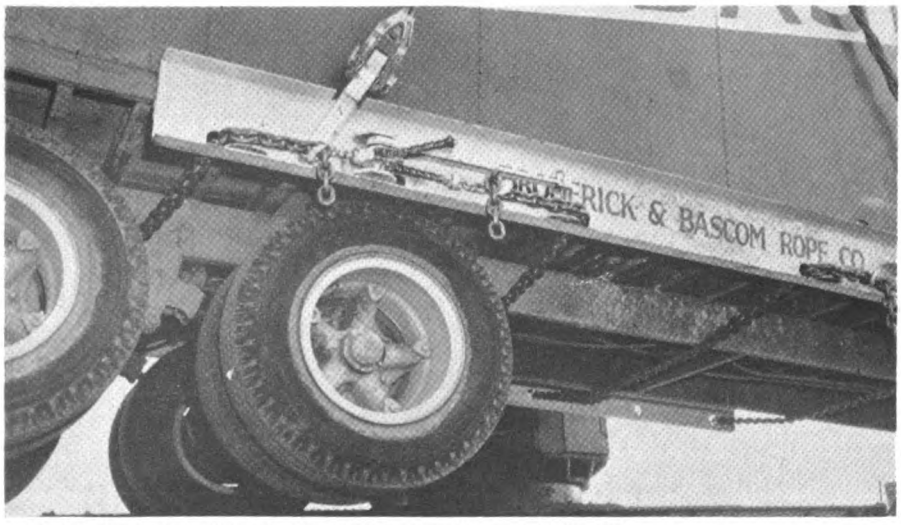
Interior sides and ends are covered with one light roller coat of primer and six successive roller coats of neoprene rubber paint. The roof interior has one coat of primer and one coat of hot-spray finish paint. The underframe has one coat of chromate primer and one coat of hot-spray freight-car finish paint after the car is assembled. One coat of chromate primer is applied to the axles.

The Barber S-2-C narrow-pedestal trucks are fitted with $3^{11}/_{16}$-in. travel springs, each cluster consisting of seven outer and four inner coils. Side bearings are Stucki and the Unit brake beams are AAR No. 18. The cars have 33-in. AAR D-33 non-heat-treated multiple-wear rolled-steel wheels mounted on 6 x 11 smooth turned axles with raised wheel seats. Timken greased-packed roller bearings are applied to the 6 x 11 journals.

Wabash Designs Trailer Lift

A lifting assembly for handling trailers during salvage operations and for loading and unloading piggyback cars has been successfully tested by the Wabash at its Decatur, Ill., shop and is now in service. The Broderick & Bascom Rope Co., cooperating with trailer manufacturers and railroads, designed and built the device. The actual demonstration lift was 7 tons.

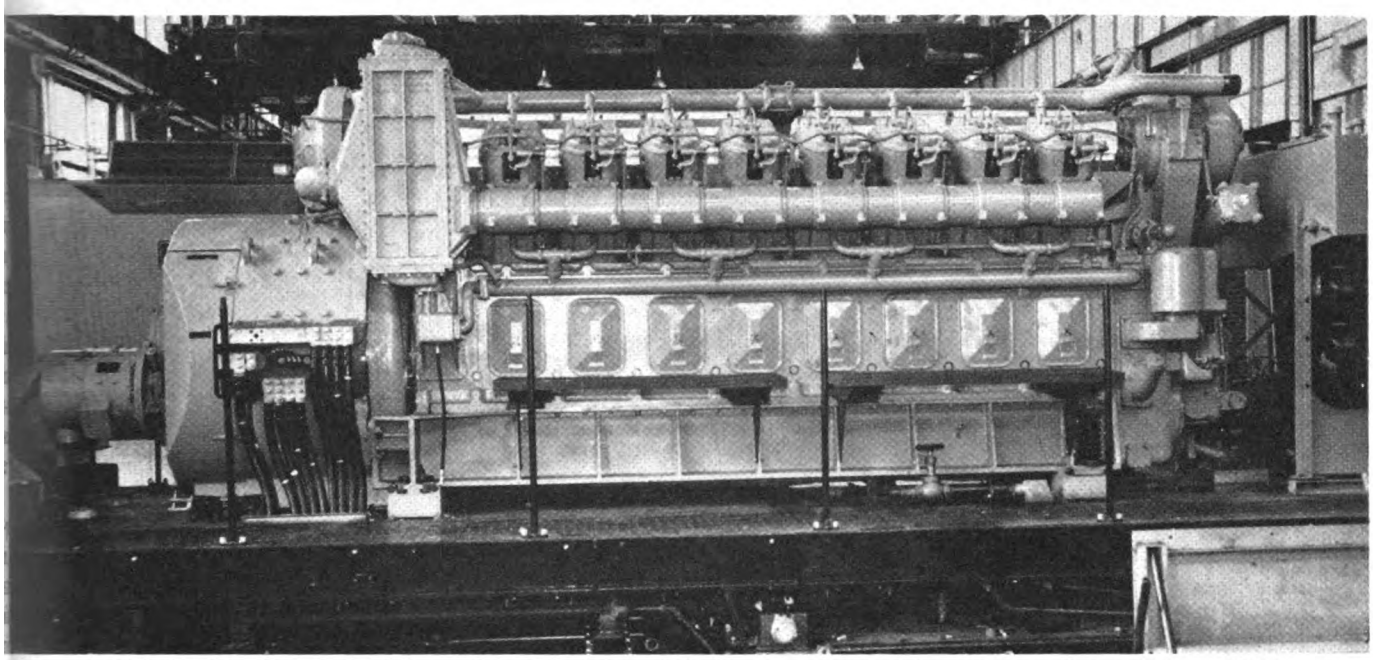
The assembly is applied by lowering it over the trailer. The side rails are lined up along the lower edge of the trailer sides. Snubbing chains pass under the trailer through the opposite side rail and are tightened with ratchet load binders. Adjustment for center of gravity, if needed, is made by loosening the binders, sliding the side rails to position, and retightening the binders. The M1-BT 10-ft braided wire rope slings attached to the lifting beam consist of eight parts of ½-in. rope. The twin thimble fittings allow the rope to run completely around the thimble. Assembly weighs 1,500 lb and has a rated capacity of 80,000 lb.



Ratchet tightens chain through side rails for snug fit along trailer sides.



Center of gravity adjustment is easily made.



FDL-16 diesel installed on 2,500-hp road switcher at General Electric plant is result of development work started during 1940's.

GE Diesel Powers 2,500-Hp Locomotive

Four-cycle, V-type engine, product of extensive development program, is prime mover for U-25B

First production model of the General Electric Type 7 FDL-16 diesel engine was put in service four months ago. This four-cycle, 16-cylinder engine is the prime mover which has been designed to power the 2,500-hp U-25B road switcher with which GE has entered the domestic main-line diesel locomotive market (RL&C, June 1960, p 25). The production engine is the culmination of 15 years of design and development. It offers, according to GE, reliable performance, maximum fuel economy, and minimum lube oil consumption. Long life is expected of critical parts, such as bearings, pistons, liners, and rings.

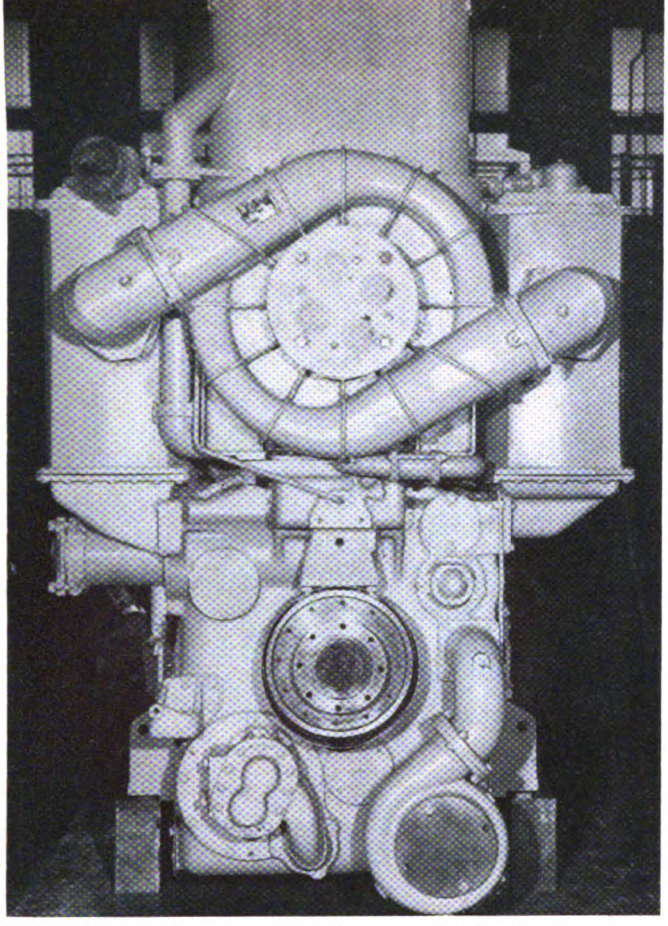
Successful performance of a 4-cycle engine in small and medium power locomotives demonstrated its suitability for traction applications, and a full-fledged development program was initiated in 1953. The latest development, the 16-cylinder engine, has been undergoing extensive tests on demonstrator locomotives operating in fast freight service on numerous U.S. railroads whose officers report highly satisfactory results.

From a paper presented by William W. Peters, manager, Railroad Locomotive Engine Advance Engineering, General Electric Co., before recent ASME Railroad Division meeting.

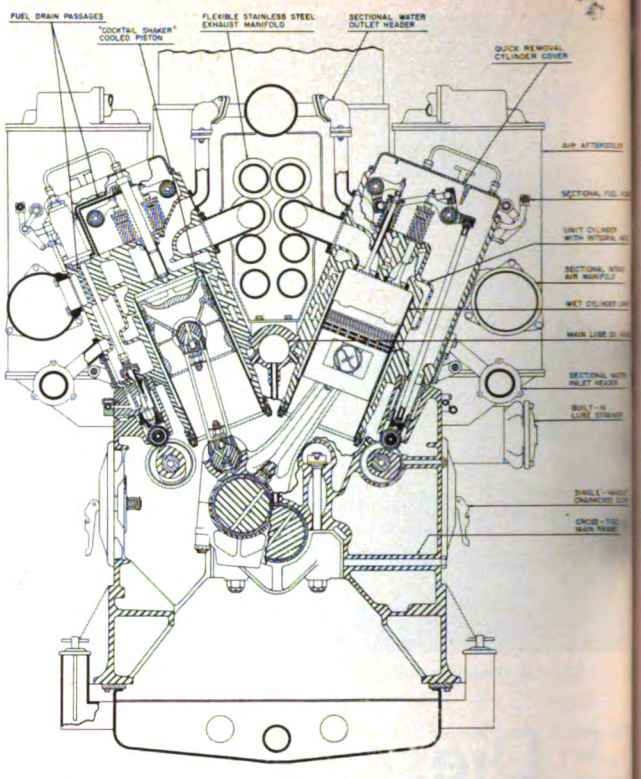
The basic design of FVA series of 6-, 8-, 12-, and 16-cylinder engines was made in the early 1940's by Cooper-Bessemer. By the end of World War II the first 6-cylinder engine had been commercially applied on a GE locomotive. Original engine rating was 110 hp per cylinder, equivalent to 131 psi BMEP (brake mean effective pressure). While the design called for speeds up to 1,300 rpm, early engines were run at 1,000 rpm, and this has continued to be the operating speed. Many basic features have been retained, including the integral head and cylinder arrangement; the four-valve cylinder head with the two intake valves outboard and the two exhaust valves inboard; the cast-iron piston; the bolted piston pin; the cast main frame, and the master-and-link articulated connecting rod system on the V-type engines. While practically every part has been changed or modified somewhat, ratings have been steadily raised to the present value of 204 psi BMEP without alteration of any fundamental engine dimension.

A number of the first production engines, six-cylinder-in-line types, were in operation in the field when it was realized that further development and redesign lay ahead. Principal problems and their solutions were:

- Forged-steel crankshafts were substituted in all engines for the original alloy cast-iron shafts because of the unpredictable service life of the cast shafts.
- Increased thickness of piston crown and ring carrier wall alleviated piston cracking.
- Original rings, particularly top compression rings, would not withstand the high combustion temperatures resulting from insufficient supercharging and were changed to improved alloy rings.
- Hardened grooved piston pins were substituted for the original pins which were too soft and did not have adequate provision for lubrication.
- Improved valves and valve springs were developed.
- Flexible couplings in the fuel rack shaft between cylinders wore, causing considerable unbalance of cylinder loading. Subsequent development has completely eliminated this basic rack arrangement.
- An improved and more efficient turbosupercharger increased the air supply, reducing combustion temperatures.



Turbocharger delivers air to aftercoolers on each side of V-type engine. Design eliminates most external engine piping.



Cylinder and head are a single assembly on the FDL-16 engine. The articulated connecting-rod design has made it possible to increase the crank-pin bearing areas. The V-type design is based on an in-line engine which was first put into service in 1940's. This type of prime mover is still built for lower horsepower locomotives.

By 1950 both the 6- and 12-cylinder engines were giving satisfactory commercial service at 110 hp per cylinder. However, it became apparent to GE that the engine was too costly and too heavy to compete effectively in the railroad field. Surveys and studies were then made to determine whether this basic design offered possibilities for improvement, or whether an alternate design should be considered. GE conclusion was that this prime mover appeared to have the greatest potential for high-horsepower locomotive application. By the end of 1953 it was decided to push development of the Cooper-Bessemer V-8, V-12, and V-16 cylinder engines. In 1954 four locomotive units were built by General Electric to operate as a rolling laboratory on the Erie (RL&C, April 1955, p 65). Two units had V-8 engines operating at 1,320 hp, and the other two had V-12 engines operating at 1,980 hp, both at 1,000 rpm. While this represented about 50% higher BMEP than had been sold commercially, laboratory testing at Cooper-Bessemer showed that proper supercharging would enable the engines to handle these ratings.

Mechanically, the engine has proved to be very rugged, particularly as far as the piston, wrist pin, and connecting-rod bearing are concerned. Because of the bolted pin construction, wrist-pin bearing area is virtually double that found in conventional engines of the same bore. The master-and-link connecting-rod arrangement almost doubles the connecting-rod bearing area for a given crank-pin length. These features, coupled with large crank pins and main bearing journals, plus a rigid main frame, indicate that further increases in BMEP are possible.

The major engine design change made while developing the higher rated engine was to substitute a thin chrome-plated liner for the thick integrally cast cylinder liner. This liner is assembled from the bottom of the cylinder with considerable interference fit. The liner is now held with a bolted clamp ring at the bottom end, the fire seal at the top is a captive copper-ring gasket. These changes overcame difficulties experienced with water leaks and failure to seal against high gas pressures.

Basic advantage of the thin liner construction is that it gives the lowest possible inner wall cylinder temperature at the top of the piston travel where lubrication is marginal at best and where temperatures are high at high outputs. The liner is chrome plated to provide maximum resistance to wear.

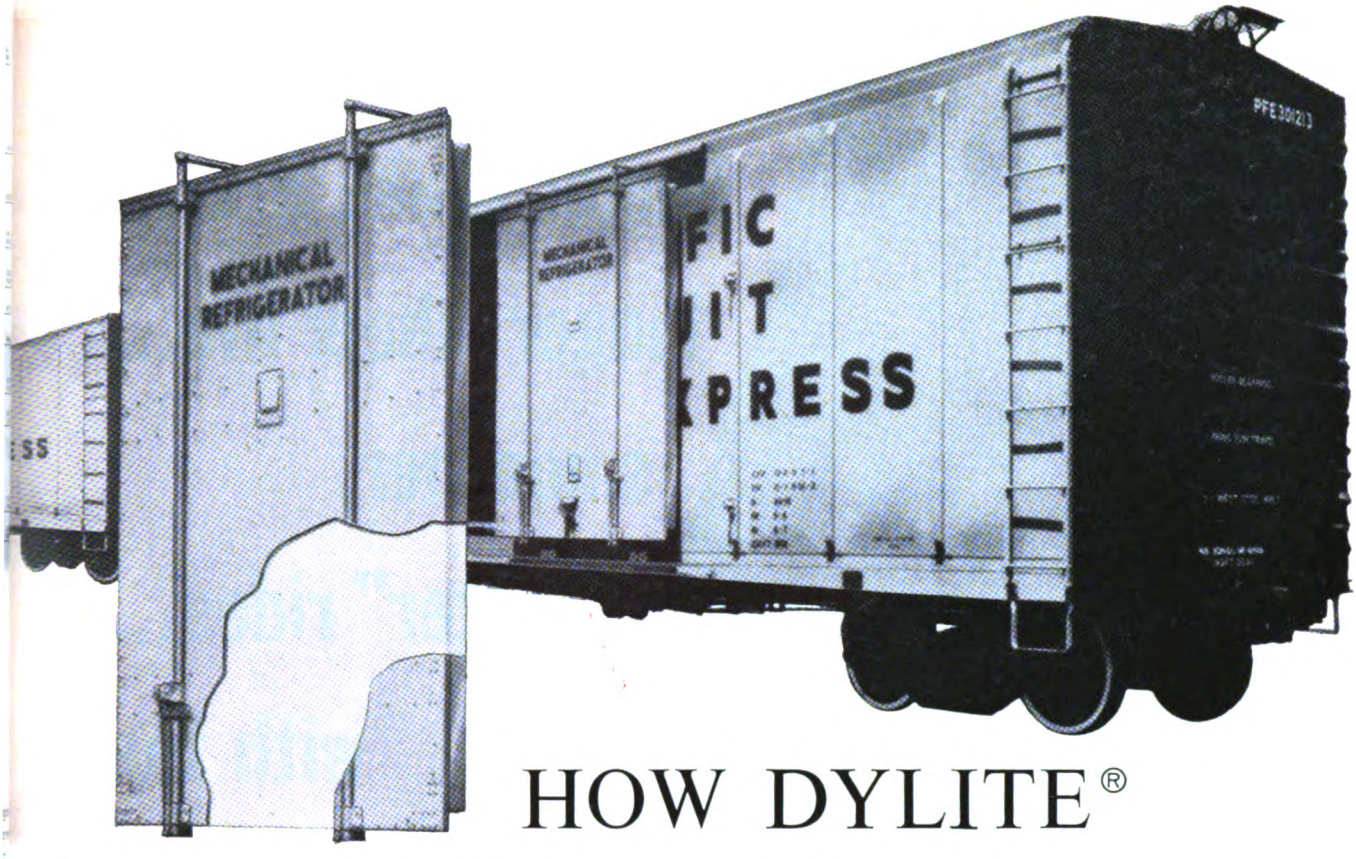
Original head covers allowed leakage from the high-pressure fuel-line connections to enter the lube oil and cause excessive dilution. The cover was initially modified to place the high-pressure fuel line and fittings outside the cover and subsequently to allow the cover to be removed without breaking the high-pressure fuel line. Now only one wing nut is used to hold the cover in place.

Replacement of the bronze cam roller bushings on the fuel-pump drive with Lubrited steel bushings solved the problem of failures under the higher loads imposed by the increased engine rating. Other bearing problem

(Continued on page 26)

FDL-16 Engine Specifications

Number of cylinders	16
Gross rating, hp	2,750
Dry weight, lb	38,500
Bore, in.	9
Stroke, in.	10½
Engine speed, rpm	1,000
Valves per cylinder	4
Oil control rings	2
Compression rings	4
Wrist-pin area, sq in.	23.5
Bearing area, sq in.	39
Crank-pin diameter, in.	7 7/16
Main bearing area, sq in.	34
Main bearing diameter, in.	8



HOW DYLITE® GOT ITS FOOT IN A FREIGHT CAR DOOR!

This unique refrigerated freight car door is insulated with DYLITE expandable polystyrene. This lightweight foamed plastic forms a tight, moisture-proof, non-sagging insulation. DYLITE freight car doors improve insulation and weigh 400 to 500 pounds per car set less than conventionally-insulated doors. These doors are now being installed on 1,025 new refrigerated freight cars of the Pacific Fruit Express Company. The cars are temperature-controlled from –10°F to 70°F.

The door liner is molded of CYCOLAC* ABS plastic made by the Marbon Chemical Division of Borg-Warner Corporation. The idea to combine DYLITE with CYCOLAC came from Robert L. Landis, developer and manufacturer of the new door liners which are now manufactured by the Landis Industrial Company, Santa Clara, Calif.

DYLITE comes in the form of tiny crystal beads. When heated, these beads can expand up to 60 times their size and fuse; forming a light, smooth-skinned part at the desired density. DYLITE is a remarkable low temperature insulator having a K factor of 0.242 at 2 lbs./cu. ft. density and a 75°F mean temperature. It is low-cost, non-shrinking, and can be molded to almost any size or shape. In addition, DYLITE is strong, durable, moisture- and vapor-resistant.

For more information on the outstanding insulating qualities of DYLITE expandable polystyrene, write to Koppers Company, Inc., Plastics Division, Dept. 1106, Pittsburgh 19, Pa.

DYLENE® polystyrene, SUPER DYLAN® high density polyethylene, DYLAN® polyethylene, and EVENGLO® polystyrene are other fine plastics produced by Koppers Company, Inc.

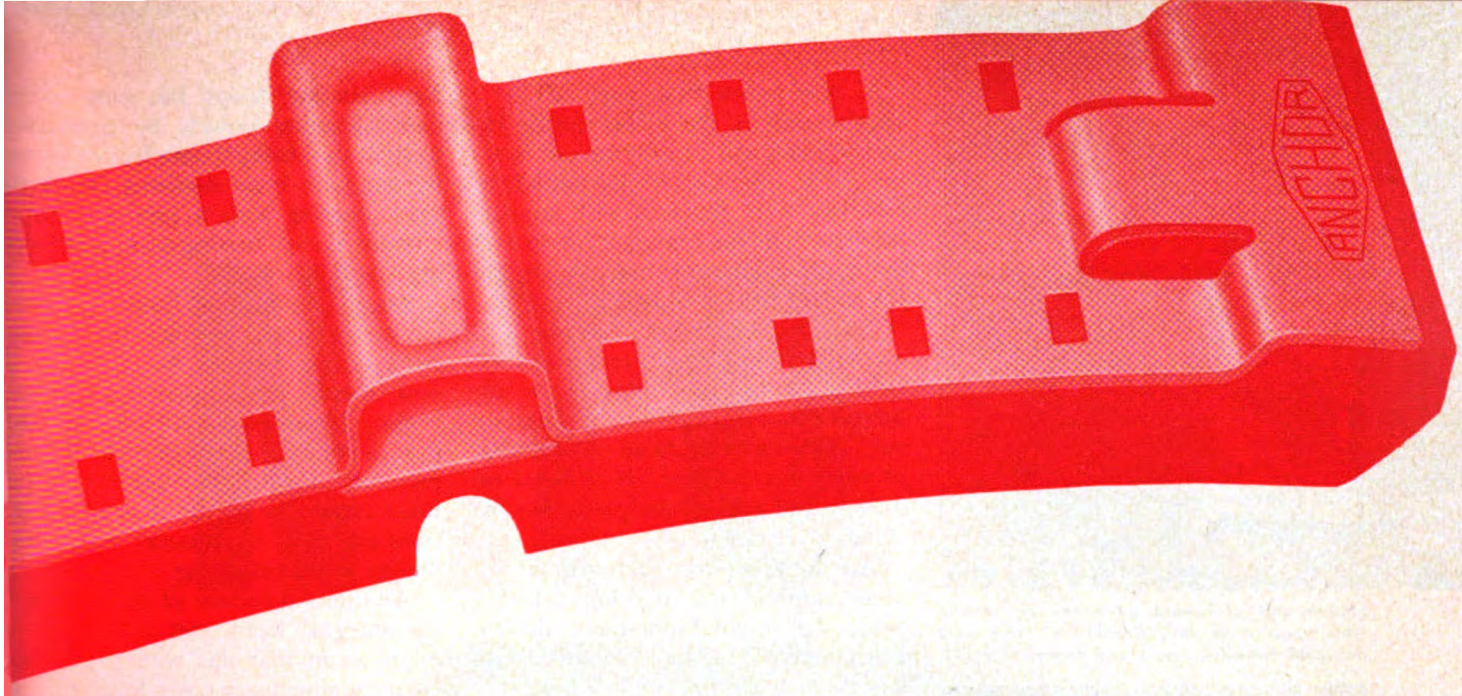
**CYCOLAC is a registered trademark of Borg-Warner Corporation*

KOPPERS PLASTICS



longer brake life... longer wheel life... smoother, "softer" rides... with the

- Lower maintenance costs per train operation mile
- Substantially lower replacement costs
- Stable friction at all speeds
- Monetary savings quickly amortize conversion costs



ANCHOR* COMPOSITION

TREAD BRAKE SHOE

Higher and more uniform friction . . . reliable braking performance under all normal operating conditions—that's the ANCHOR Composition Tread Brake Shoe. (Braking forces required are approximately *one-half* those needed with other shoes for equivalent stop performances.)

This reduced shoe load permits a correlative reduction in the size of the air actuating chamber, or by changing brake mechanism. And there's no need to vary brake cylinder pressure to provide high shoe forces at high speeds, with a corresponding lowering of shoe forces as speed is diminished.

The lower forces also cause less wear on pins and bushings—which means less brake rigging maintenance. Truck members can be lighter, less bulky . . . and less costly.

The ANCHOR Shoe successfully meets any known operating conditions. So . . . where superior stop performance is an absolute essential, specify ANCHOR.

Call your Griffin Service Representative and discover for yourself how the ANCHOR Composition Tread Brake Shoe can effect substantial economies in your operation.

GRIFFIN WHEEL COMPANY

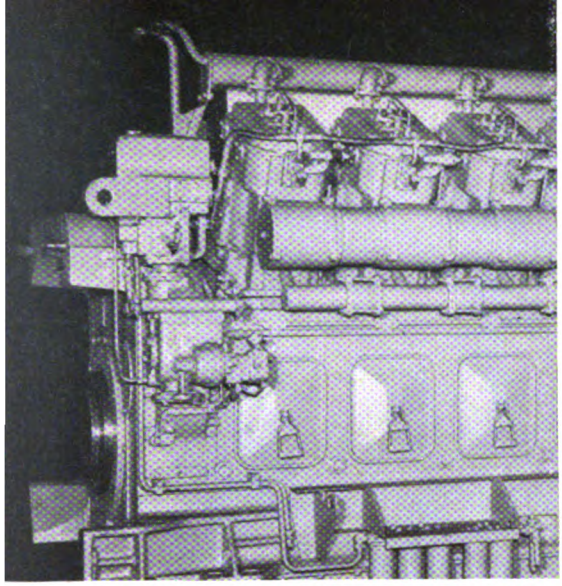
445 North Sacramento Boulevard • Chicago 12, Illinois

GRIFFIN STEEL FOUNDRIES LTD.
St. Hyacinthe, Quebec; Transcona, Manitoba, Canada

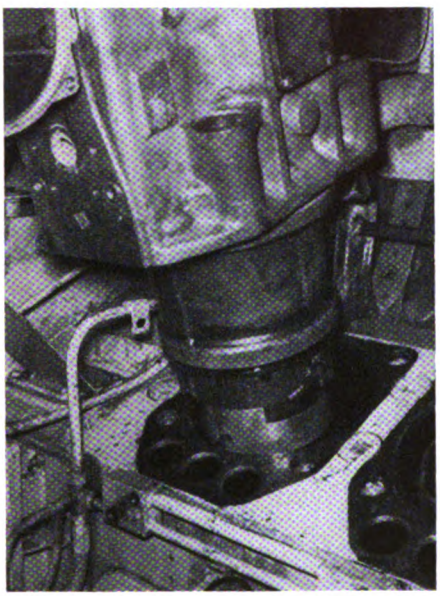
**The trademark ANCHOR is the property of Griffin Wheel Company*



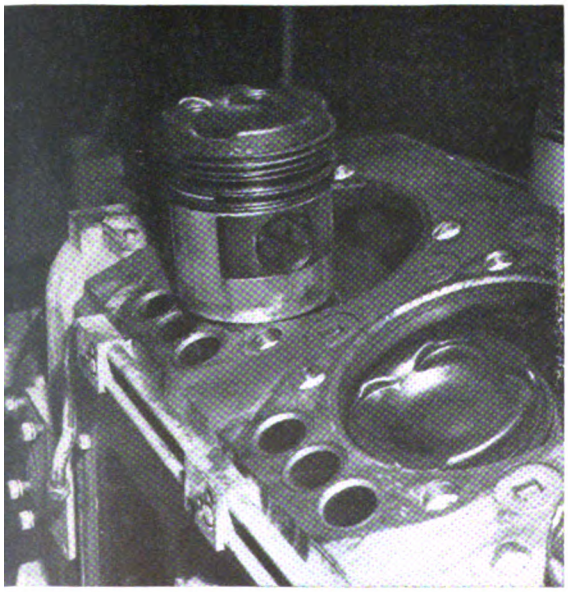




Engine and overspeed governors are driven from single drive unit. Crankcase covers were designed for easy access and explosion relief.



Unit cylinder assembly is lowered over piston with special guide which is shown installed. Air manifold section is integral with head.



Piston inspection and repair can be completed after the unit cylinder assembly is removed.

(Continued from page 22)

encountered at the higher rating involved main and connecting-rod bearings. The original trimetal thick-babbitt type were replaced with copper-lead trimetal type bearings. Along with the bearing changes, journals on the crankshaft were nitrided.

The origial manifold, fabricated of a combination of mild- and stainless-steel plate, had seal rings at the slip joints. Finally, a lightweight stainless-steel manifold with twice the number of pipes was adopted. It is based on well proved aircraft designs and is the standard.

An alloy die-cast sectional air intake manifold was developed to replace the original one-piece design. Each manifold section is removed with its cylinder, giving complete flexibility and simplifying cylinder removal. The first crankcase access doors, secured with a series of bolts and studs, have been replaced with a combination quick-access and explosion-relief door of pressed steel which is operated by a lever and toggle bar. The overspeed shutdown system now consists of a Woodward PSG governor, with a self-contained oil pump supplied with engine lubricating oil, which operates air shut-off butterflies in the turbocharger air discharge elbow.

Because the 16-cylinder engine for domestic use did not have any precedent in U.S. railroad service, there was no interchangeability problem. Therefore, certain major design improvements were incorporated before it was first tested in 1958. Roller bearings, except those in the governor and water pump, have been eliminated. Gear and shaft supports have been greatly simplified. Gear and camshaft adjustments have been eliminated; tram marks indicate the proper gear mesh for engine timing.

Cylinder rocker arms are lubricated by pressurizing the cross-heads and feeding lubricating oil through the push rods. This eliminates external lubricating oil lines on the engine.

Drive gears for the water and lube-oil pumps are mounted on the pump shafts and mesh directly with an idler gear inside the engine front end cover. The pumps fit into accurately located rabbet fits; there is no need for gear-lash adjustment of these assemblies. Governor drive is now a single, externally mounted gear package driving both main and overspeed governors.

Main bearing diameter is 8 in. and the crank-pin diameter is 7 7/16 in. The basic bearing design has now el- nated locating dowels by provi tabs on the shells, themselves. Th flanges have been removed from main bearing with a separate s circular thrust bearing now perfo ing this function.

Deepening the main frame to ob greater stiffness simplified the en construction, because the subbas now simply an oil pan; the en frame is mounted directly on the lo motive platform. Lube oil strainer pressure regulator have been incor rated internally in the design of front end cover to eliminate joints flanges in the oil piping.

An unusual feature of the desig the integral head and cylinder. might seem that this would incre engine maintenance costs. Statistics dicate that the most frequent mai nance items on an engine are pis rings and valves. Because it is nec sary to remove only four hold-do bolts and break the water, air and haust manifold connections, an en cylinder assembly can be remo from the engine by two men in ab 15 min.

With the cylinder removed, piston is exposed and rings can changed readily. A reconditio cylinder can then be applied in ab the same time. The application rings can be completed without turbing rod bearings. With the inder removed, valve seat inserts be replaced readily. The liner is removable and replaceable in cas damage.

Because the cylinder asse weighs nearly 600 lb, it is nece to have tools and fixtures handle a hoist or a crane for this replace

Future uprating of the engine depend largely on the avilabili improved turbosuperchargers. P sure ratios of the order of four-to are needed to carry the future a pated higher loads at high altitu

Even when output is 25 % a the present commercial rating, o ation is virtually smoke-free. S limit is not expected to be a fact determining ultimate engine r Low fuel consumption goes with combustion. The production T FDL-16 engine operates consis at full load fuel rates of less than 0 lb per bhp-hr with fuel having 1 Btu or higher heating value. I fuel consumption for this engine a plied in the locomotive is less tha lb per hr at 400 rpm.

NATIONAL

1961

ANNUAL REPORT

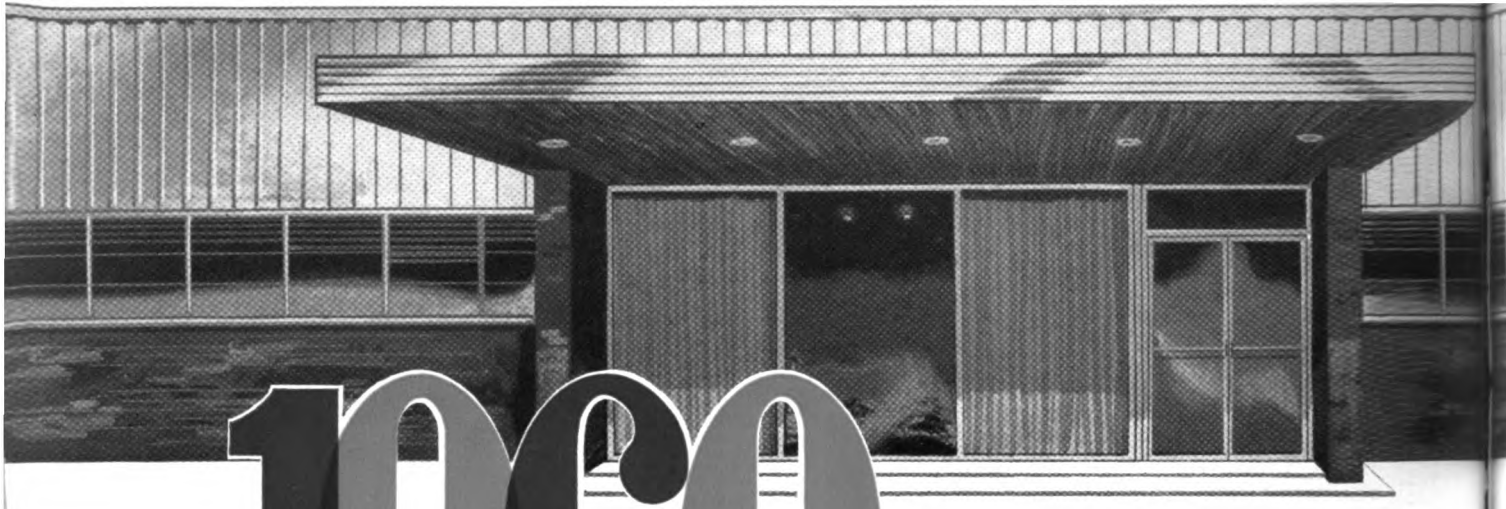
TO AMERICA'S RAILROADS

93 Years of Service to Transportation and Industry

PRODUCTS • SERVICES • PRODUCT DEVELOPMENT

Transportation Products Division

NATIONAL
MALLEABLE AND STEEL
CASTINGS COMPANY
Cleveland 6, Ohio



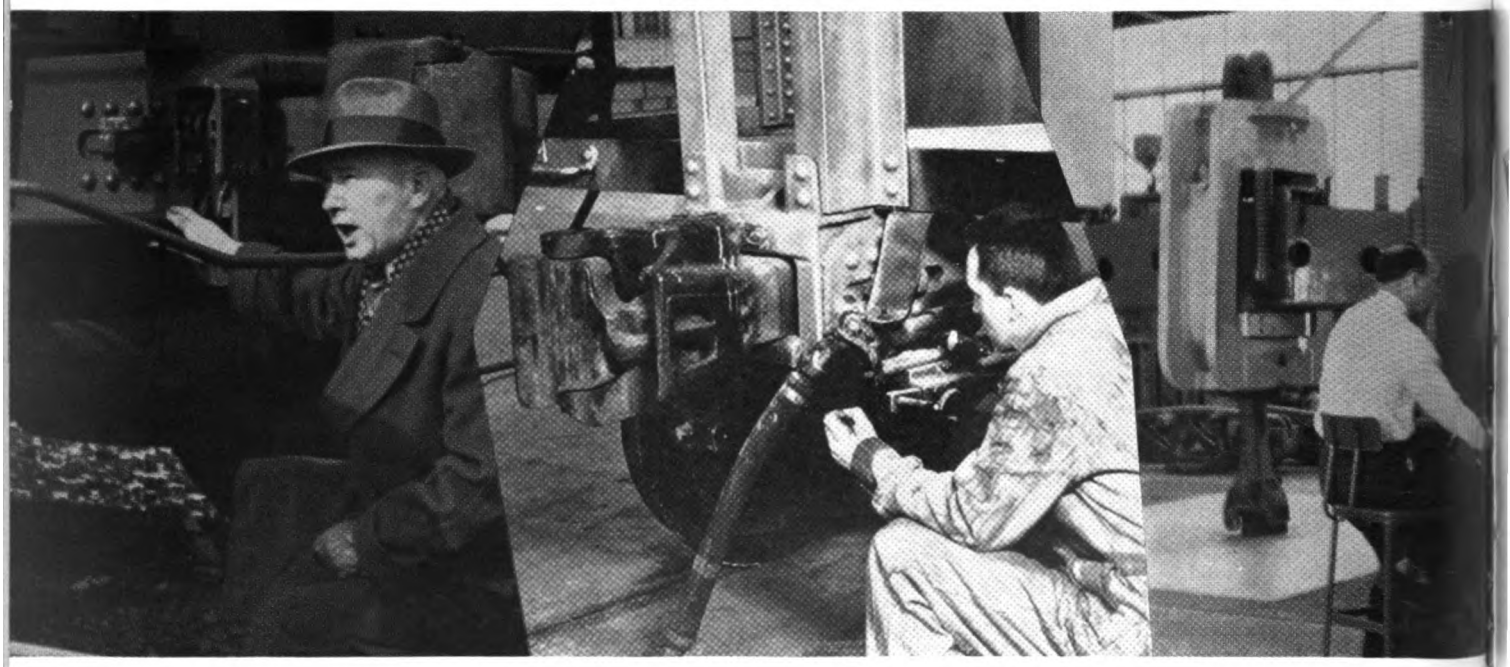
1960

●●● *the year in brief*

National's Technical Center, Cleveland, continued to make substantial contributions to railroading through its large pool of scientific, technical and engineering talent, and its unparalleled physical facilities for conducting projects involving research, development, engineering and advanced testing.

Many of these investigations centered on products of National manufacture, while others involved other makes on a direct-comparison basis in order to upgrade National's product line still further.

This background of talent, physical facilities and experience form the warp and weft of a pattern of specialized knowledge to be found nowhere else in the railroad equipment field either domestic or foreign.

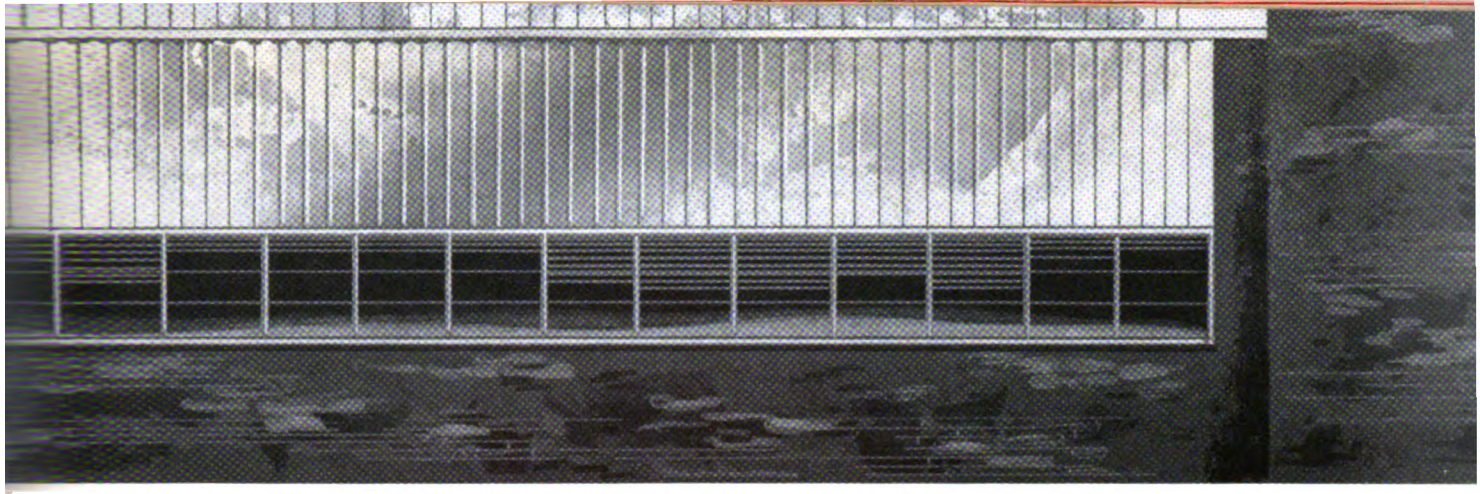


Field Investigations

Field investigations were performed under both normal day-to-day and extreme operating conditions. Some of these investigations were performed as a routine part of National's continuing customer service program, others at the request of railroads where our representatives acted as trained and impartial observers, still others working in concert with AAR committees.

Contract Research

Among the many contract research projects conducted during 1960 were: AAR static tensile design tests on yokes, testing of floor jacks in our million-pound test machine, AAR drop test of knuckle pins, road tests of military trailers, static testing of nailable freight car flooring, impact tests on special rubber cushioning devices, and other investigations of a related nature.



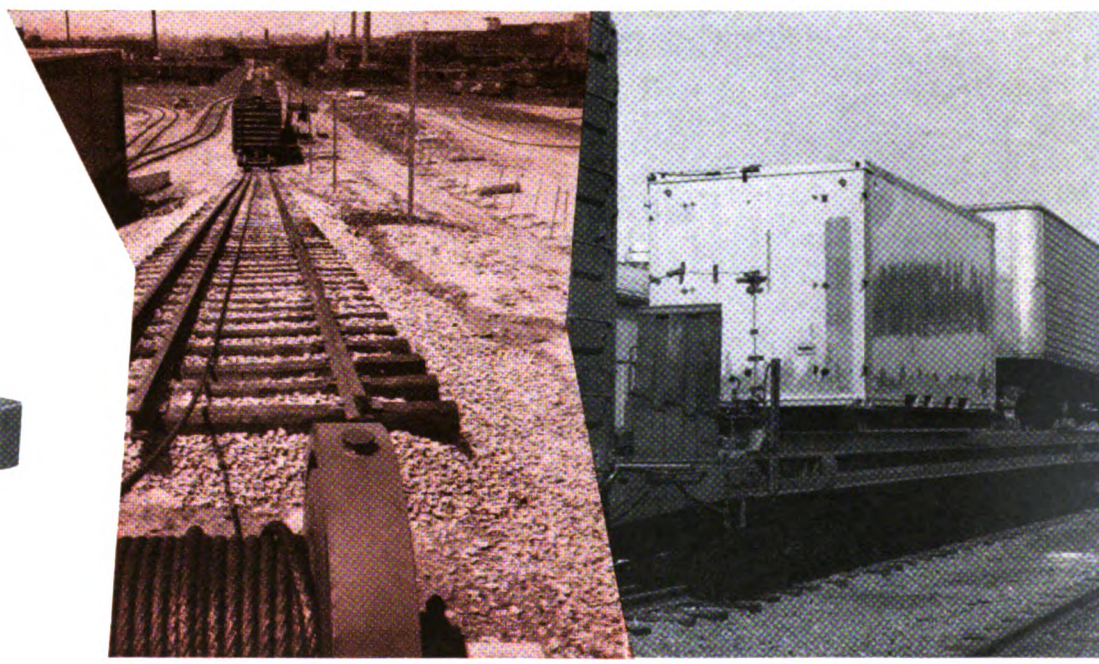


Dedicated to Service and Research

Scientific Research

One of the most important aspects of the Technical Center's activities, scientific research is an area in which it frequently makes some of its most significant contributions to the skill of railroading, as well as to the advancement of engineering technology in many other industries. Research is regularly performed in the areas of mechanics, dynamics, structures, metallurgy, hydraulics and pneumatics, chemistry, electronics and physics — all of it so-called "hard" research with a view to making a better-performing, more saleable product at a lower manufacturing cost.



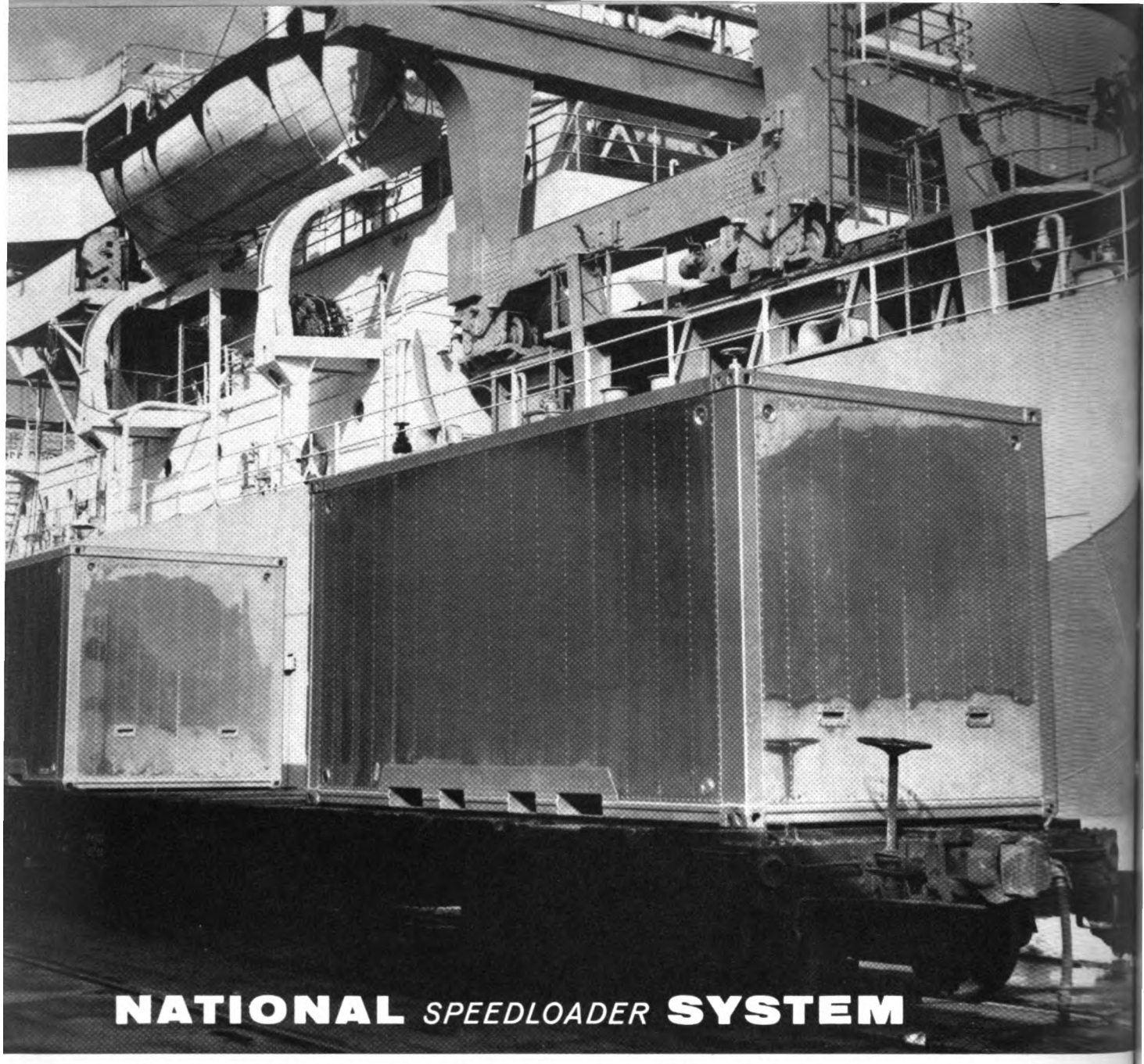


Product Improvements

Planned, systematic product improvement and upgrading programs, embracing every phase of the company's product line, are a dedicated, year-round activity that makes the National trademark unique in the railway equipment industry. A small cross section of 1960 activities includes ultimate load tests on freight car side frames and high tensile steel bolsters for a major western railroad, tests on improved springs for M-17-A friction draft gear, which have subsequently received AAR approval, impact tests on 75-foot TTX cars and on special rubber cushioning devices, static and anti-creep tests on couplers, and many others.

New Product Development

National's new product development program has many facets, both within and without the railroad field. Revolutionary designs are under intensive development and testing in the areas of impact control, protection of car structures and lading, and other devices of a confidential nature to make for better railroading, more economical shipping and handling at lower costs. Coincident with its railroad new product development program, National is also working in other directions involving the marine, automotive and farm equipment fields, and with the military.



Automatic Cargo Container Handling System

Now Fully Developed for Use by Rails, Ships, Trucks, Plants

While the first National Speedloader System installation was designed expressly for a ship operator, National has never lost sight of the fact that containerization of cargo, and its automatic handling, would generate traffic for railroads, and has, consequently, kept the Speedloader design flexible toward this end. During the last year, the National Speedloader System has been steadily improved to the point where it is now fully developed for use by all forms of transportation.

Furthermore, the Speedloader System is compatible for use with present fully automatic or semi-automatic handling methods such as existing cranes, slings, hooks, fork lifts or straddle carriers. Conversion of flatcars or truck trailers for Speedloader operation is a simple matter involving minimum capital investment. Containers, additional cranes or other lifting devices can be purchased competitively from manufacturers of such equipment since the Speedloader components are adaptable to all.

Transportation Products Division

GEARED TO PROGRESS P R I MEMBER

International Division
Cleveland 6, Ohio

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NATIONAL SPEEDLOADER CONTAINER HANDLING SYSTEM

Ken Discovers the A's Have It

An unexpected release of brakes on a passenger train had raised questions about the 26-L air-brake equipment in the minds of Ken and Slim, the road foremen of locomotives for the district. They had turned to George, system air-brake instructor, for an explanation and cure. George told them about the P-2A application valve, an improved design, which was being used on recent 26-L brake installations. The offending passenger unit had been equipped with the P-2 application valve which could, under certain conditions, give a brake release in the course of recovering a penalty brake application. Having described how the P-2A prevented this, George went on to a description of the other brake functions which involve this improved application valve.

This is Part 2 of the fourth installment in a series on the 26-L brake. Part 1 appeared in the December issue, p 30.

"Let's now go into the other features," George said, looking up from the diagrams of the 26-L equipment which were spread out on his desk. "Before going any further, we should look at the valve and piping diagram. You will notice that when a locomotive is equipped with a P-2-A application valve, only two Relayair valves are needed instead of the three which are required when using the P-2 valve. Note also that less piping is involved."

"I can see that," said Slim. "What are the 'additional functions' you were mentioning?"

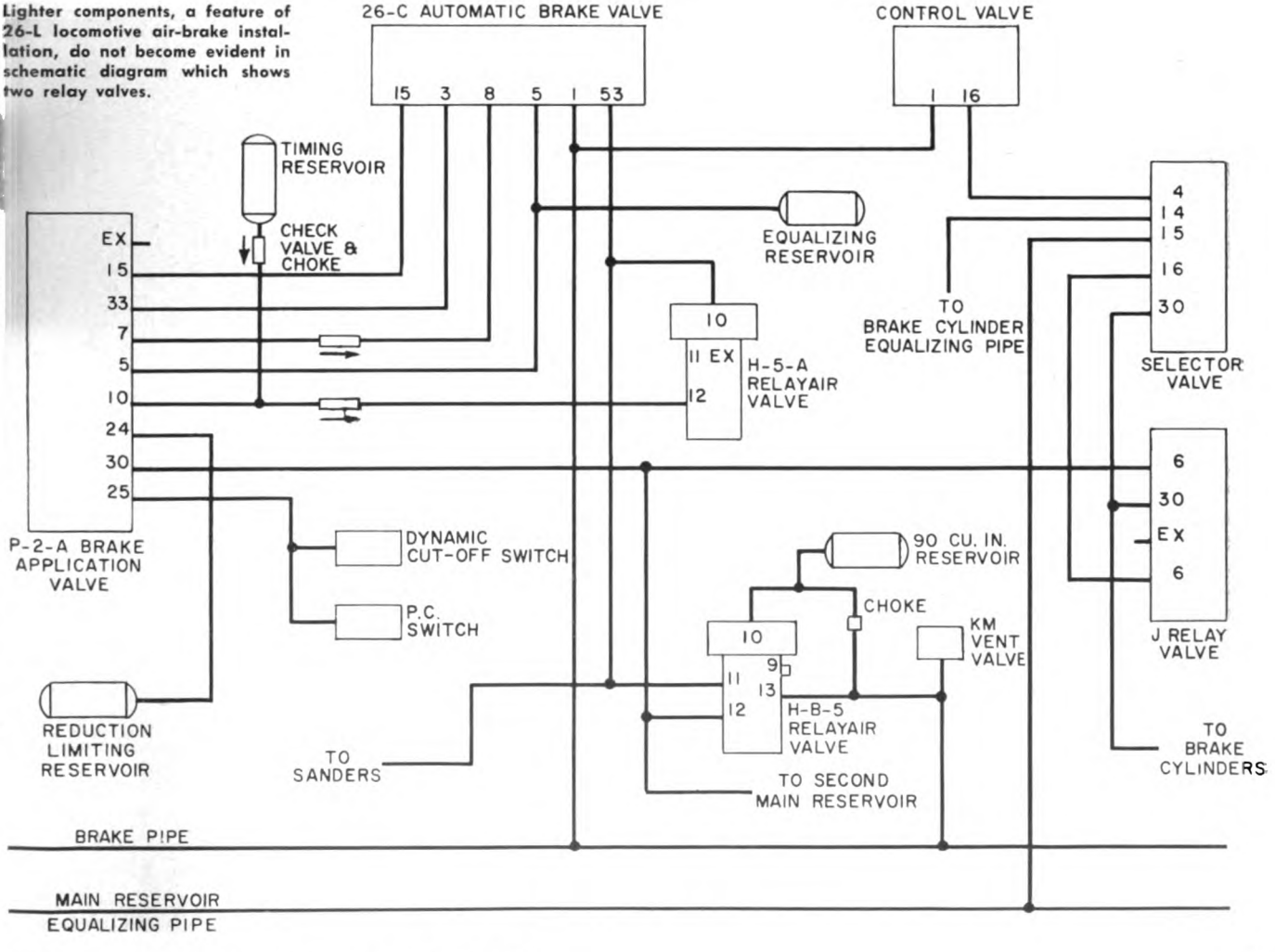
George went on to explain that, on locomotives equipped with 26-L equipment, break-in-two protection can be accomplished by various Relayair valve arrangements which result in "power knockout" (PC) or dynamic cut-off and an emergency brake application.

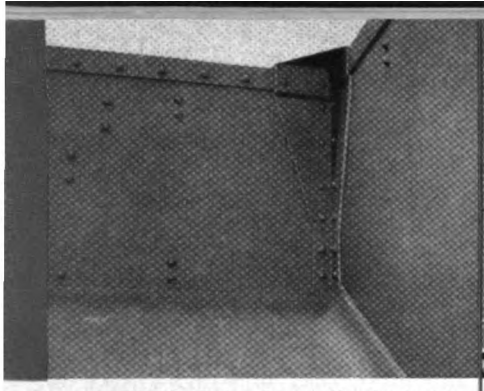
On a locomotive equipped for safety control—one having the P-2 or P-2-A Brake Application Valve-break-in-two protection can be provided with a simple arrangement of Relayair valves connected to the brake pipe and the application valve. They are sensitive to an emergency rate of brake-pipe reduction which would occur during a break-in-two.

Locomotives for m-u operation have an F-1 Selector Valve connected to the main reservoir equalizing pipe. When a break-in-two occurs between two 26-L locomotives or between a leading 6-SL locomotive and a trailing 26-L unit, loss of main reservoir equalizing air will cause the F-1 selector valve on the trailing locomotive to assume a *Lead* position, which allows control air from the control valve on the locomotive to flow to the relay valve and apply the brakes. An F-1 selector valve so positioned prevents the loss of brake-cylinder equalizing air.

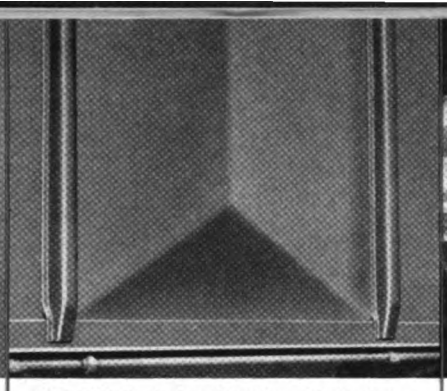
(Continued on page 34)

Lighter components, a feature of 26-L locomotive air-brake installation, do not become evident in schematic diagram which shows two relay valves.

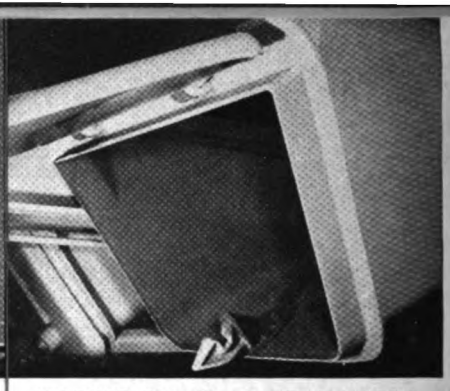




FEATURE: Extra Strength. An inside band, in addition to the usual corner cap, gives added strength to inside top corners where ordinary hopper cars often fail. This construction "extra" is typical of the attention-to-detail that gives PS-3s rugged durability.



FEATURE: Extra Service. Vertical embossments pressed into side sheets between side posts minimize flutter under shake-out machine use and increase service life to sides. Quality features such as this assure purchasers maximum value when they buy PS-3s.

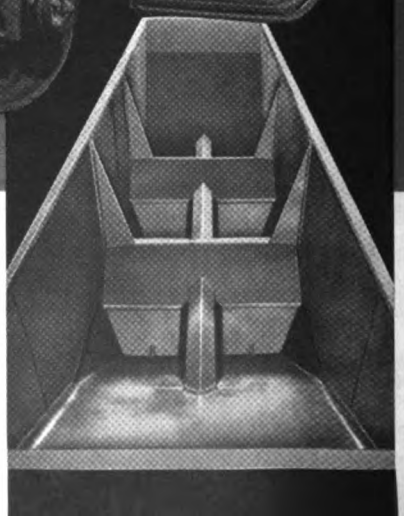


FEATURE: Extra Stamina. Typical of PS-3 stamina are the hopper chutes and doors; both of ⅜" plate. High strength steel door frames are welded to the chutes inside and outside to provide strong, crevice-free, corrosion resistant joints.

ANOTHER BENEFIT OF P-S FULL LINE STANDARDIZATION

the rugged durability of...





FEATURE: Extra Cleanliness. Smooth floor sheets with longitudinal welds and rounded flanges at sides cause no material-retaining ledges or pockets to encourage corrosion or slow unloading processes.

PS3



Durability is another of the many built-in and proved characteristics of the standardized Pullman-Standard PS-3 Hopper Car.

This feature, along with high availability and low maintenance performance, is common to the full line of P-S standardized rolling stock. But, due to the punishing demands of hopper car service, durability is a prime requirement of hopper cars and it shows up at its best in the standardized PS-3.

Hopper Cars

3 HOPPER . . . *70-ton Capacity*

Close attention to every design and construction detail results in the kind of durability that keeps maintenance at a minimum; keeps the PS-3 in revenue producing service. Such items as solid crossridge braces, butt welded plates, flanged floor sheet edges and smooth hopper chutes, all result in faster, cleaner unloading and greater shipper acceptance. Embossed side sheets, rugged inside corner bands in addition to corner caps, flanged hood sheets, high mounted air brake reservoir and heavy-duty hopper chute plates and doors with high strength steel door frames provide longer in-service life, low maintenance . . . rugged durability. Investment in Pullman-Standard PS-3s will prove to be a wise addition to your hopper car fleet.



THIS FOLDE
The whole sto
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BIRMINGHAM • PITTSBURGH • NEW YORK

J. C. Fennelly Company, San Francisco, Representative

Ken Discovers the A's Have It

(Continued from page 31)

"To explain the operation and to illustrate all the features of the break-in-two protection on a 26-L locomotive," George said, "we will study one arranged for safety control, multiple-unit, and break-in-two protection. This unit will be equipped with the basic 26-L equipment, plus a P-2A brake-application valve, an F-1 Selector Valve, one H-5-A Relayair Valve, and one H-B-5 Relayair Valve."

During normal operation with brake valve in release position, the brake pipe is fully charged along with pipes 10 and 13 to the HB-5 Relayair Valve and the 90-cu in, reservoir. The H-B-5 Relayair valve will be in its upper position. With the Relayair valve in this position, main reservoir supply in port 12 of the Relayair valve is cut off at the valve and port 11 is connected to port 9. The P-2-A brake application valve is charged, and the spring chamber and timing reservoir air are connected to port 12 of the H-5-A Relayair valve. Main reservoir air will flow from port 3 in the brake valve to port 33 of the P-2A Brake Application Valve and then to the top of the release control valve.

Nullifying Dynamic Brake

If a break-in-two occurs, the break-in-two features are actuated to nullify the dynamic brake or cause power knockout. Control and selector valves function to give an emergency brake application. Brake-pipe air pressure in pipe 13 to the H-B-5 Relayair valve drops rapidly, reducing pressure in the spring chamber. Pressure in the 90-cu in. reservoir, along with that in port 10 of the H-B-5 Relayair valve, begins to drop. The choke fitting causes air to exhaust to the brake pipe very slowly. Pressure retained in port 10 and above the diaphragm of the H-B-5 Relayair valve forces the piston down, connecting main reservoir air in port 12 to port 11.

Main reservoir air supplied to port 11 in the H-B-5 Relayair valve flows to several components:

- To sanding reservoir and then to sanders;
- To port 53 in the brake valve and then to the brake-pipe cut-off valve in the brake valve, closing the cut-off valve to prevent further brake-pipe charging; also from port 53 to an exhaust port in the brake-valve cut-off valve giving engineman an audible warning of a break-in-two;
- To port 10 of the H-5-A Relayair valve, then to the chamber above the diaphragm and piston where pressure forces the piston to its lower position; air from the P-2-A valve-spring chamber and timing reservoir connected to port 12 of the H-5-A Relayair valve flows past the open lower valve to port 11 and atmosphere; a pressure differential is established across the diaphragm sufficient to cause it and its attached spool valve to be moved upwards to its application position.

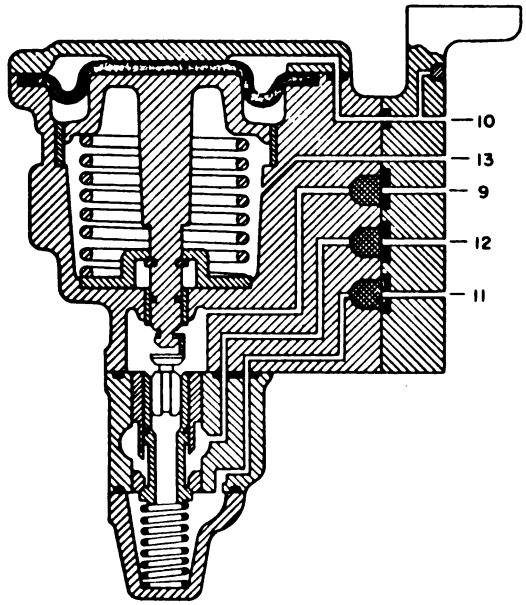
In application position, the spool valve makes several connections. Main reservoir air in port 30 and in the chamber beneath the diaphragm is connected to port 25, actuating the PC and dynamic cut-off switches. Main reservoir air in port 30 through choke and port 10A is connected to port 8. The chamber on the spring side of the diaphragms and the timing reservoir volume are connected to port 8, which is connected to lock-over pipe 8 in the brake valve. This connection is normally vented to atmosphere through the suppression valve when the automatic brake-valve handle is in release position.

Equalizing reservoir charging via port 15 or the brake valve and port 15 and 5 of the P-2-A brake-application valve is cut off. Equalizing reservoir air in port 5 is connected through the spool valve to port 24A via a choke and through port 24 to the reduction limiting reservoir. Equalizing reservoir air is allowed to equalize at a controlled rate in the reduction limiting reservoir to produce a full service brake application.

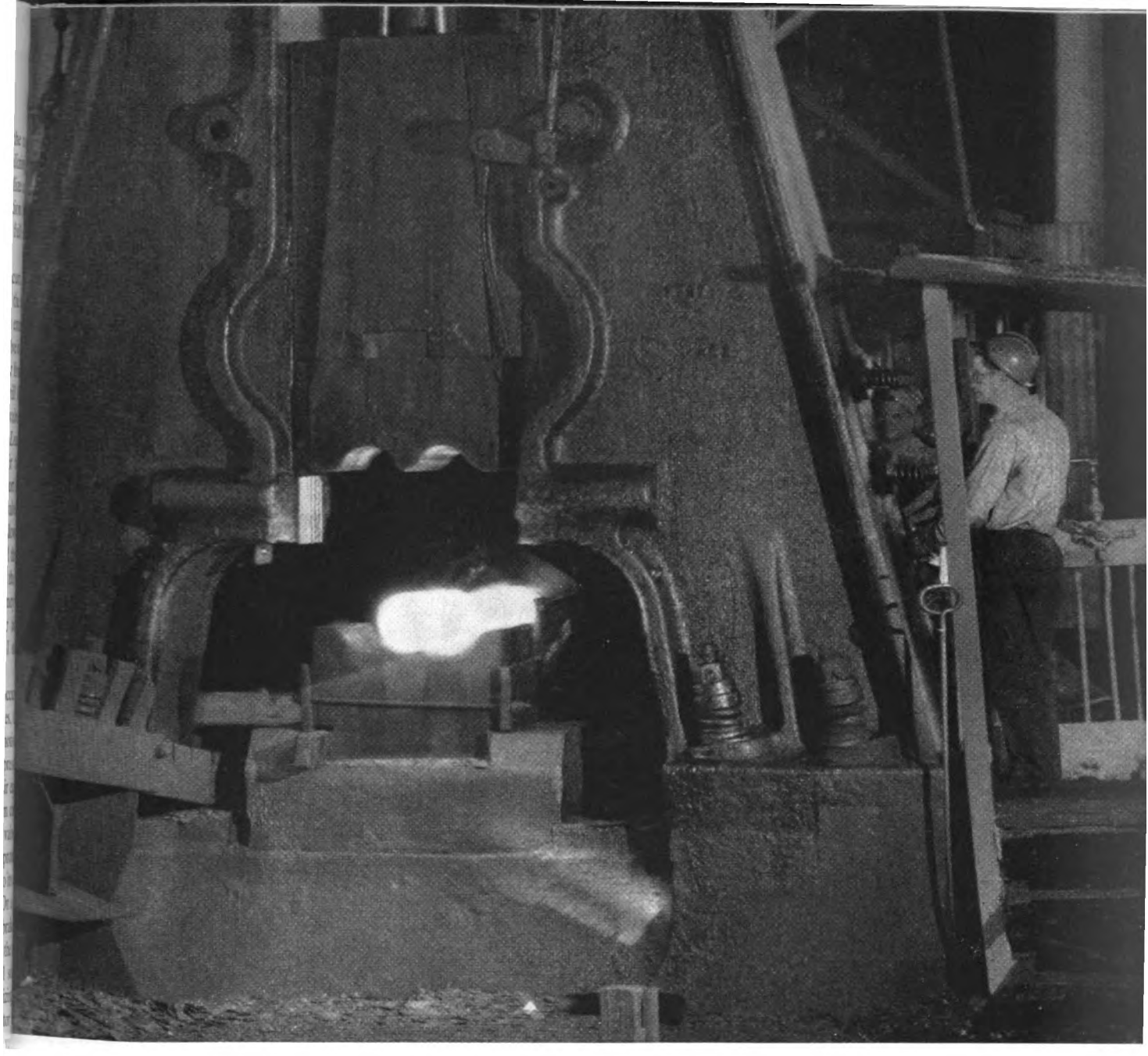
When a break-in-two occurs, brake-pipe pressure in port 1 of the control valve will be reduced at an emergency rate, placing the control valve in emergency position. Control air from port 16 of the control valve will flow to port 4 of the F-1 selector valve. The selector valve positioned in *Lead* position allows the control air to flow through the spool valve to port 16 and then to port 16 of the relay valve. The relay valve is actuated and allows main reservoir supply in port 6 of the relay valve to flow to port 30 and the brake cylinders, giving an emergency brake application. Brake-cylinder air also flows to port 30 of the F-1 selector valve.

When a break-in-two occurs between two 26-L locomotives, or between a leading 6-SL locomotive and a 26-L trailing locomotive, pressure is reduced in the main reservoir equalizing pipe which vents air from connection 15 of the F-1 selector valve and the chamber below the protection spool valve which is forced to its lower position by spring tension. On a leading locomotive, the flow of brake-cylinder air from port 30 of the relay valve via port 30 of the F-1 selector valve to brake-cylinder equalizing pipe connection 14 of F-1 selector valve is cut off by protection spool valve.

(Continued on page 44)



H-B-5 Relayair valve functions to afford protection during any unexpected separation between the units of a muntiple-unit locomotive. Sanders are also supplied with air through it



Birth of a blue-ribbon roller-bearing axle

Wham! goes the wallop of the 10,000-lb. hammer and another Bethlehem roller-bearing axle begins to take shape. The die has two grooves, one to form the journal and one for the body. After one half of the axle is formed, the bloom is turned end-for-end, and the other half is similarly shaped.

This is just one step in the most modern roller-bearing axle setup in the world. The recent completion of Bethlehem's modernization program at Johnstown, Pa., brought about a realignment of operations, along with the installation of the latest in high-speed machines, to permit smooth progression of work to the highest quality standards.

You can order freight car roller-bearing axles to either AAR Standard or Alternate Standard. You can also look to us for complete finish-machining of roller-bearing axles for freight cars, passenger cars and diesel locomotives, as well as plain-journal freight car axles.

A Bethlehem engineer will be glad to discuss your axle needs with you. Just get in touch with our nearest office, or drop a line to the address below.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

On Canadian National Refrigerator Cars . . .

Cushioned Racks Cut Lading Damage

Elimination of damage to dressed beef occurring during shipment in refrigerator cars has been a problem confronting American railroads for years. The Canadian National soon will have 27 cars in service in which 10-ft sections of the overhead meat racks at the ends of the cars are spring mounted. Tests on two of these 40-ft cars, which were rebuilt with this vibration damping system, have been so encouraging that the road has undertaken the rebuilding of 25 additional cars with the same arrangement.

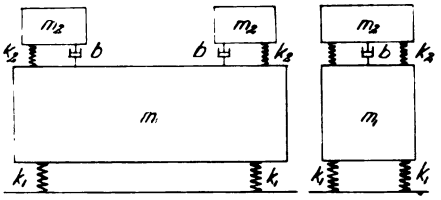
According to the CNR, the use of the vibration absorber which these spring-mounted racks form has proved to be an economical and effective short-term solution for the beef-damage problem. It is easily applied, but the system is not applicable to all types of loads requiring protection from vertical vibration.

Initially, it was believed that longitudinal impacts were the cause of beef damage in transit and that an underframe cushioning device would be necessary to prevent damage. The study actually indicates that the cause is probably inadequacy in truck design. Opinion on the Canadian National is that "there is an urgent need for improvement in the riding qualities of existing freight-car trucks, particularly in the high-speed ranges, so that all fragile commodities may be protected adequately."

While cost of beef-damage claims is small, the CNR is concerned about diversion of this traffic to other transportation agencies and is interested in regaining traffic already lost.

The dressed-beef traffic considered in the study originated either at Edmonton, Alberta, or Winnipeg, Man., and was shipped to Montreal, Que., distances of 2,160 and 1,360 miles, respectively. All cars arriving in Montreal with damaged beef were inspected. Either the meat hook tears through the ribs of the front quarter, or the beef jumps from the hook or the rack and falls to the floor.

From a paper by W. H. Cyr, chief mechanical engineer, Canadian National, presented before the recent meeting of the Railroad Division, ASME.



Frahm dynamic vibration absorber was adapted for railroad application by CNR. Auxiliary masses m_2 mounted atop the primary mass m_1 serve to prevent resonance in the system.

Over 100 cars were investigated at Montreal, and the following pattern was established:

- Invariably damage was confined to the ends of the car;
- Damage occurred in cars either with 2½- or 3⅛-in. spring-travel trucks equipped with built-in snubbers;
- Inspections revealed no single defect which could be associated with poor riding;
- Several different loading methods were tested and all were susceptible to damage.

It was suspected that the damage was caused by impacts. On 40 trips cars carried impact recorders. When it was not possible to establish a relationship between the severity of impacts and beef damage, two road tests were conducted on trains carrying carloads of hung beef between Edmonton and Montreal to learn more of the effects of speed on the riding qualities of refrigerator cars. There were continuous records of longitudinal impacts, vertical vibrations, and train speed. Loads were checked at each division point.

There were no overspeed impacts during these tests and yet beef was damaged. Vertical acceleration increased with speed, but did not appear to be excessive until the train speed exceeded 50 mph. Between 55 and 60 mph, the magnitude increased appreciably and, as 60 mph was reached, a rhythmic motion with high acceleration was observed. Inspections at division points confirmed that damage occurred only when the train speed exceeded 50 mph for appreciable periods.

It became apparent that the primary cause of damage was vertical vibration, not impacts. The road te indicated that, at high speed, the c body can be subjected to a resonar condition of vertical vibration.

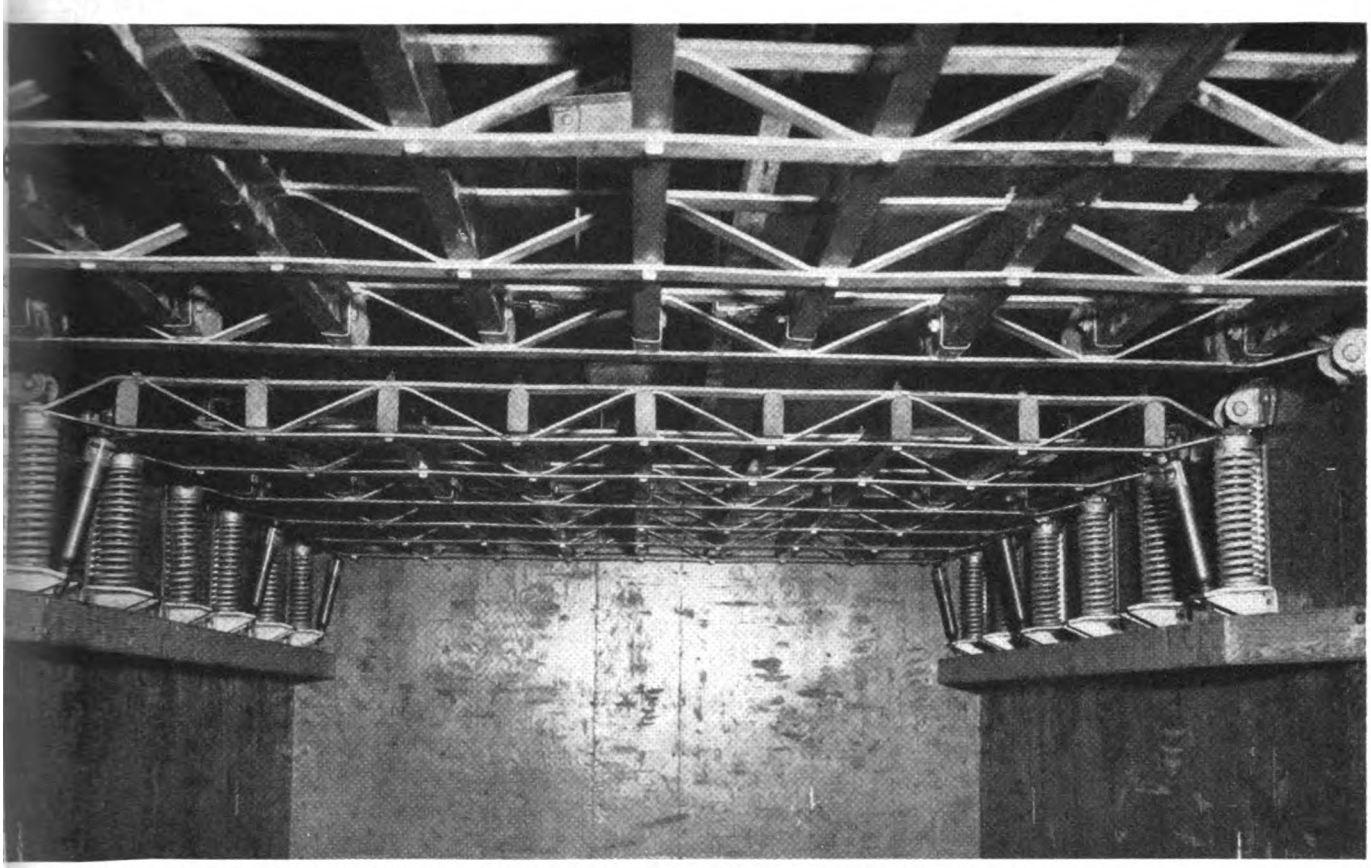
A rail vehicle is a complex syste with many degrees of freedom. Fo practical consideration, the syste may be considered as having thre types of motion which can exist inde pendently, each with its own natura frequency. These are bounce, pitch and roll. Under bounce or linear v bration, the springs in each truc move vertically in phase, while unde pitch or rotational vibration, th springs in one truck move verticall 180 deg out of phase with the spring in the other truck. When the car i subjected to roll, the springs at on side of a truck move out of phase wit the springs on the other side of th same truck. Under normal operatin speeds, all three types of vibration oc cur simultaneously. Each will tend t become predominant when the exci ing frequency due to the wavy natur of the track profile under dynami loading coincides with the correspond ing natural frequency, a conditio known as resonance. Assuming tha the exciting force originates at the ra joints, every half rail length, or 19. ft, resonance for roll is reached at 1 mph; for bounce, at 42 mph, and fo pitch, at 58 mph.

Resonant Speed

Tests showed that, at 60 mph, se vere vertical vibrations were set up in the car which caused a marked in crease in the damage to the dressed beef load. Calculations now indicate that resonant pitching motion coul be set up in the 60 mph range. Th amplitudes of vibration would b greatest at ends of the car.

These conclusions were substan ated by a further test which was se up to compare the records of damag to beef shipped at a 50-mph spee limit to beef shipped at a 60-mp speed limit. Damage was cut by a factor of at least 2 when the 50 mp limit was observed.

Forces transmitted to the load de to vertical vibrations developed a high speed might be reduced by usin



Spring-mounted racks—one 10-ft length in each end of 40-ft car—proved sufficient to control damaging vibration.

truck springs with a considerably softer spring rate so that the speed at which resonance occurs would be well below the normal operating range. To reduce the resonant-pitch frequency of the refrigerator car to 10 mph, a spring with a static deflection of 32 in. would be required. Such a spring could not be applied to existing truck side frames because of space limitations. The difference between the empty and full-load static deflections would exceed the 2-in. allowable variation in coupler height.

A secondary means of isolating vibrations had to be considered. The dynamic vibration absorber, invented by Hermann Frahm in 1900, provides an effective method for eliminating undesirable resonance. The most effective arrangement of the absorber system involves suspending two identical masses from the main car body, one at each end of the car. When the absorber system is arranged in this manner, it is possible to control bounce and pitch effectively. The function of the absorber system under each type of motion is as follows:

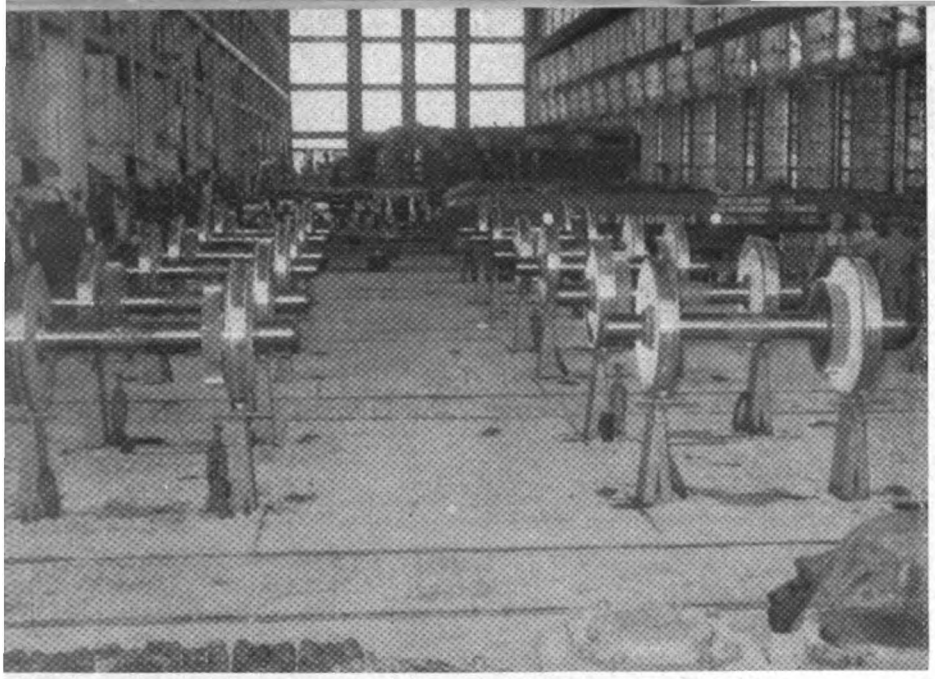
When the car body is subjected to bounce or linear motion, the absorber masses move vertically in phase with each other, but 180 deg out of phase with the truck springs.

When the car body is subjected to pitch, one set of truck springs moves 180 deg out of phase with the other and, because the absorber springs must always be out of phase with the truck springs below it, the absorber springs must also be out of phase with each other. Optimum tuning is first calculated separately for bounce and pitch. The value of optimum tuning used in the design of the auxiliary springs must be a compromise and is the average of the optimum tuning calculated to control bounce and pitch separately.

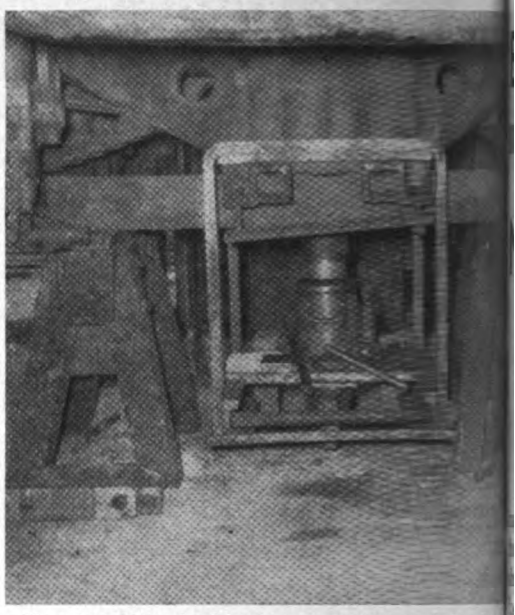
A vibration absorber designed in this manner would be effective at two points, but viscous damping must be added to make it effective over the full frequency range. A dynamic vibration absorber may be readily applied to a refrigerator car loaded with hung beef because it is symmetrical about the center of gravity and the lading weight is always approximately the same. If the meat racks at each end of the car are cushioned with appropriate springs and dampers, the beef hung on each of these sections will act as an absorber mass, without adding additional weight to the car.

To minimize the cost of equipping a car with cushioned meat racks, the absorber system was designed to make use of the existing wall brackets and rack trusses. This meant that the distance between the absorber springs and dampers was fixed. This limited the effectiveness of the system to control the roll motion, but this was not considered serious because detrimental effect of roll on the hung beef load was not found to be significant. Adequate protection was achieved by cushioning only two 10-ft sections of the meat rack, one at each end of the car. The components of the vibration absorber were designed to be attached between the existing wall brackets and the rack trusses. The cushioned sections are free to vibrate independently of each other and of the car body, acting as a support for the absorber mass in eliminating resonant vibrations and providing the required protection.

During a five-month period the two cars made 30 revenue trips between Edmonton and Montreal without any evidence of damage. Latest figures showed that, out of 60 loads moved, there was damage to three. The damage occurred when the racks were not fully loaded. This damping system does require that the absorbing masses —the loaded meat racks—have the total weight for which the system was designed.



Stands hold wheel sets in position for assembly of trucks. Each stand has a compressed air outlet which makes it easy to use pneumatic tools during assembly.



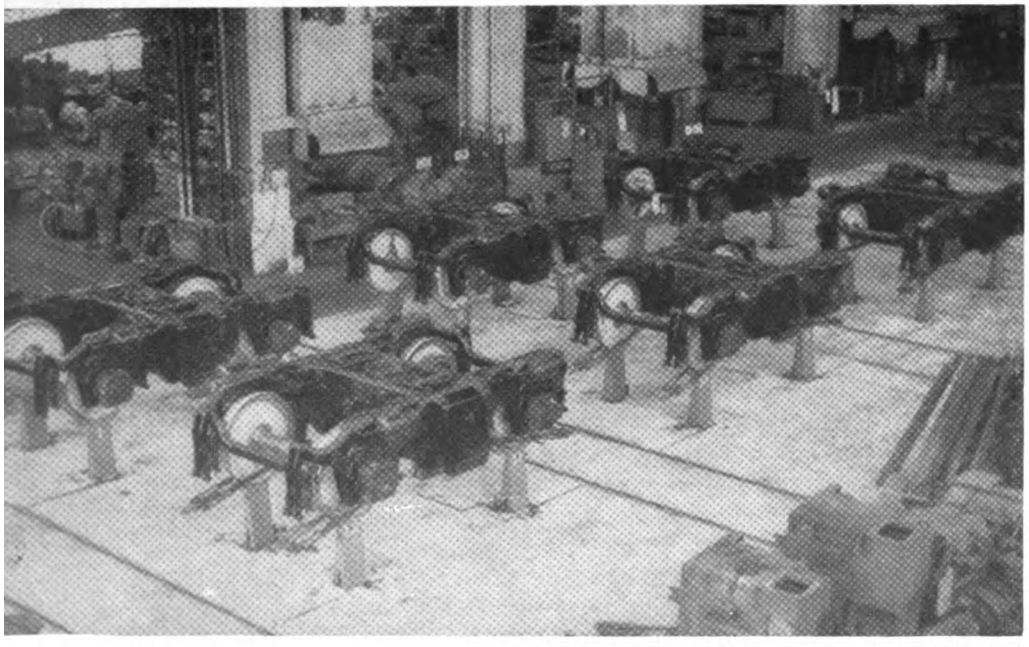
Clamping device hooks into nose spring pocket and its jack then compresses elliptical truck springs.

Diesel Truck Assembly at AT&SF Shop

More economical diesel-truck overhauls and safer and cleaner working conditions are the results of the rearrangement of the truck repair area in the Cleburne, Tex., shop of the Santa Fe. The truck stands, designed for working four-wheel trucks of General Motors locomotives, have made it possible to get truck work out of pits and off the floor. These stands are adjacent to the wheel shop and are operated on an assembly-line basis.

Tracks from the truck stands lead directly into the wheel shop. One is permanently assigned to the transfer of worn wheels into the shop and another for the return of new or turned wheels to the truck overhaul area. Supervisors rate this arrangement as one of the best labor savers at the Cleburne shop.

Each of the six truck stands is anchored in concrete and is 31 in. high. Compressed air lines extend under floor to each stand. This simplifies the use of pneumatic tools and jacks.



Wheel shop is adjacent to truck assembly area. Truck frames and traction motors can be handled with overhead crane in the main shop where trucks are rebuilt and repaired.

All trucks go to this area for inspection and repair. They are placed on stands with the overhead crane. Each workman is thoroughly trained to perform his assignment; a truck is completely stripped in about 40 min.

As trucks are stripped, the components are delivered to cleaning vats outside the shop. After cleaning, they are returned for inspection and overhaul. Disassembly of the truck frame after it is lifted from the wheels is completed by placing it on tripods. A portable clamp, equipped with hydraulic jack, is rolled under the frame and hooked on the nose spring pocket. When the jack compresses the spring plank toward the bolster, swing hangers are released. Truck frame, bolster, and spring plank are separated in only a few minutes.

In assembling the trucks, turned wheel sets are placed on the stands and the journal boxes are applied. Rebuilding of trucks is a procedure which, in general, reverses the stripping procedure.

After the assembly is completed and the motors installed, a power jack is placed under each pair of wheels so that a welding machine can rotate it, making possible a test of all bearings and the gear case. When the truck comes back to the shop floor from the stand in the overhaul area, it is ready to be painted and installed under a diesel unit.

NYC Utilizes Latest Techniques

Traction motor and main generator shops have been testing and adopting new materials and methods

How shop practices can meet changng requirements is demonstrated at he traction motor and main generator hops of the New York Central. These acilities are part of the road's Collinvood shop at Cleveland, Ohio. They vere set up nine years ago as the NYC completed the conversion of ts maintenance facilities for the hanlling of diesel locomotives. Since hen, numerous new procedures and mproved materials have been tested, nd many have been adopted as tandard.

The shop operates on a budget asis, including cost of labor, material, nd overhead. Department heads set heir own budget goals for each sixnonths' period. The present plan is o establish an annual increase in udget efficiency. Past performance ndicates that some percentage of inrease in efficiency each year is a pracicable goal.

Present work load involves the verhauling of six traction motors per ay and twelve generators per month. One traction motor armature is revound each day.

Motors and generators brought in at the receiving section of the shop are first given a visual inspection. Resistance readings of insulation are made, and all data is recorded on the permanent record which is kept for each machine. Motors are then cleaned in the vapor degreaser with trichlorethylene before disassembly. Motor armatures are degreased after disassembly if additional cleaning is required. Generators are disassembled before degreasing. Subsequent shop procedures for the overhaul of main generators and traction motors are quite similar.

Traction-motor pinions are removed with an induction-type pinion heater. Wedges are then tapped between the heated pinion and the motor frame. Motor support bearing alignment is checked by means of two special metal spools and a mating steel tube. To do this, the bearing caps are released and one spool is placed inside each bearing housing. The cap is then tightened and the steel tube pushed through the center holes of the spools. Misalignment of the bearings would be indicated by binding of the tube. Distortion of the bearing housing is checked by use of a feeler gauge around the outside diameter of the spool.

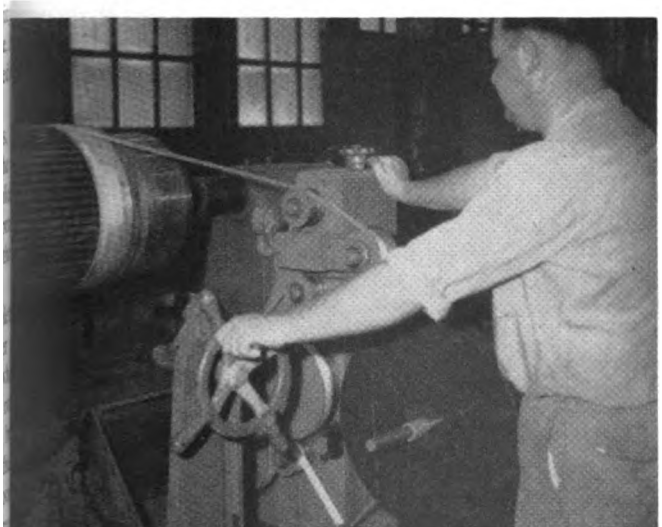
Armature bearings are cleaned, inspected, and oiled. If their condition is good, they are turned 90 deg and reapplied. The inner races are changed if necessary. When more extensive repairs are required, bearings are returned to manufacturers. If their condition does not warrant remanufacture, they are scrapped.

Motor and generator frames and armatures are cleaned in a blowout booth after degreasing. They are then moved to their respective reconditioning stations.

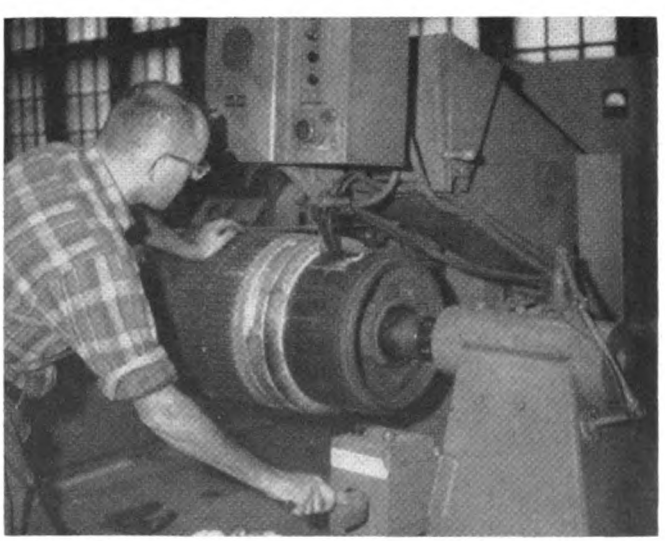
Armatures are tested both with a

On Our Cover

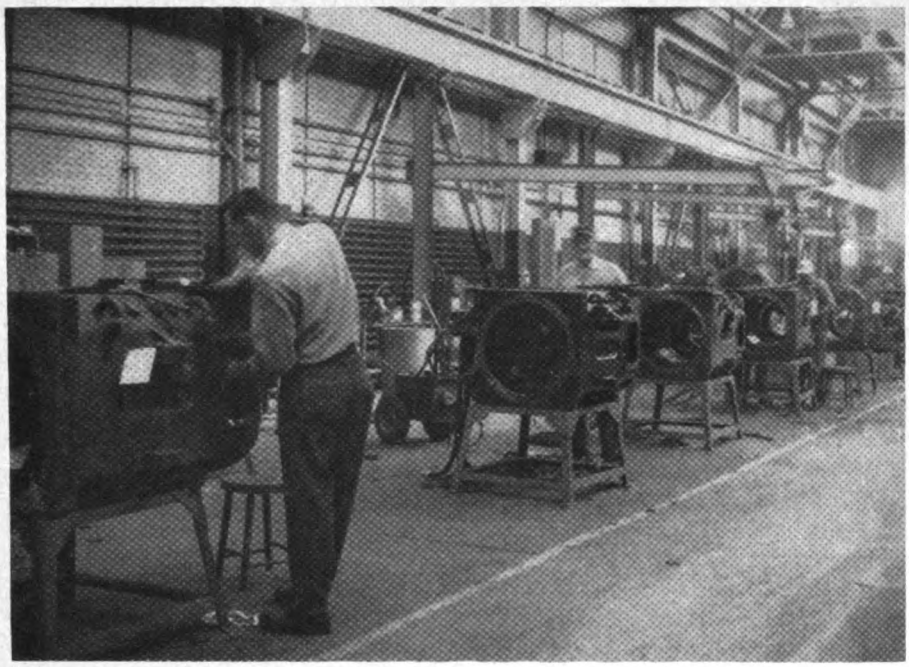
Support bearing alignment is checked at Collinwood by placing spools inside the bearings, tightening bearing caps, and then passing tube through the spools.



lass tape is now replacing steel bands on all rewound armatures as ey undergo rebuilding at the New York Central Collinwood shop.



High-frequency machine is used for all commutator soldering. Shop has been progressively equipped with latest tools since it was built.



Motor assembly takes place in one section of shop. Opposite side is equipped for the repair of armatures and frames. NYC makes extensive use of cranes and other handling devices.

megger and d-c high-potential tester. If their condition is satisfactory, they are vacuum impregnated with clear baking varnish and baked in one of the shop's three ovens. If an armature has low resistance reading, it is baked in the oven, after which it is again tested. If satisfactory, it is varnished and baked. If an armature is grounded or shorted, it becomes necessary to strip it for rewinding. End coils are cut with a carbide-tipped saw, and the coils are pulled with a hoist and come-along. Epoxy insulation does not prevent pulling coils in this manner, but necessitates some extra cleaning. This is done by dipping the core section vertically into a lye vat up to the commutator, using a special jig. The remaining bits of insulation and varnish may then be removed easily and the slots cleaned with a wire brush.

Armatures are rewound with kits. Temporary wire bands are re-rolled on the armature to pull coils tight in the slots. These are removed and permanent glass-tape bands applied at 400 lb tension. All rewound armatures receive two varnish and baking cycles. Final d-c hi-pot and megger tests are made before assembly. Commutators are turned and undercut. Stringbands are replaced and coated with epoxy resin while the armature is rotated under heat lamps. If steel bands are in good condition, the commutator end band is epoxy coated while the armature is rotated under heat lamps. This has proved effective in reducing damage caused by flash-overs. The armature is then balanced and is ready for reassembly.

Armature collars, retainers, and frame heads are cleaned in a Vapor Blast machine. The blast consists of an abrasive material in suspension in a liquid. After cleaning, the parts are rinsed with rust inhibitor. Brush holders are disassembled and cleaned in an acid cleaner. All porcelain studs are replaced with polyester glass studs. Worn parts are replaced and spring tensions adjusted.

Field coils are first given insulation tests. If the insulation is sound, leads between coils are reinsulated. Outside leads, field coils, and pole pieces are replaced if necessary. No field coils are reinsulated. Replacement consists of epoxy-insulated coils supplied by a manufacturer or outside repair shop. All replacement coils are tested at 1,000 volts while submerged in water before being used. The assembled motor frame is then impregnated in varnish and baked.

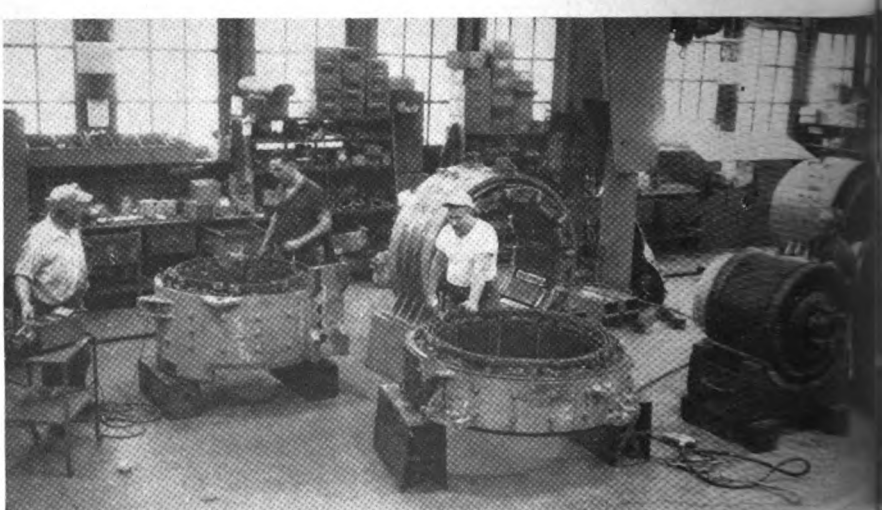
The motor, after final assembly, is given a run-in test under load which consists of high field current and full armature voltage, each supplied by separate generators. After the test, motors are given final megger and d-c hi-pot tests. Exposed metal parts are coated with protective grease.

Motors are shipped to installation points on special skids. These skids are designed so they may be picked up from any of the four sides by a fork lift truck. This aids materially in placing them in a car.

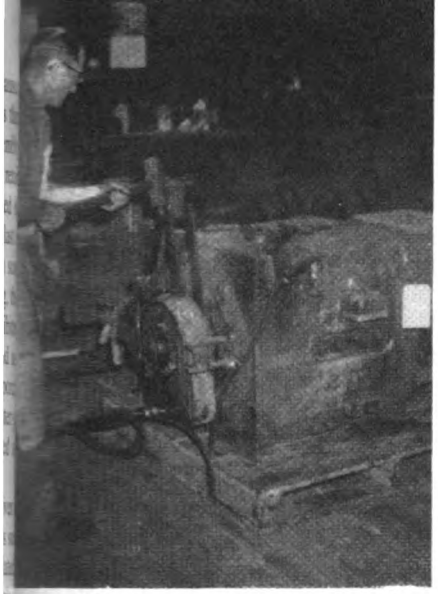
Main generator overhaul is essentially the same as that for traction motors, but generators are not given a running test.



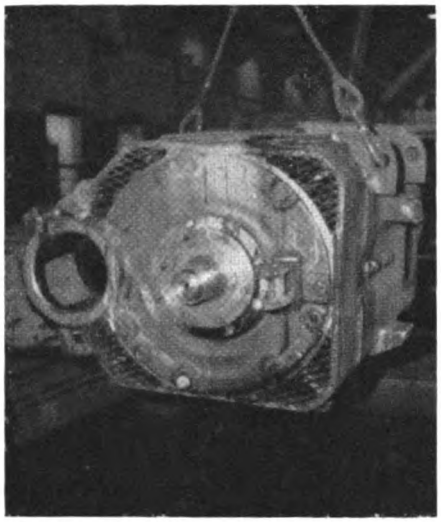
Shop-built positioner simplifies the disassembly of the heaviest diesel main generators.



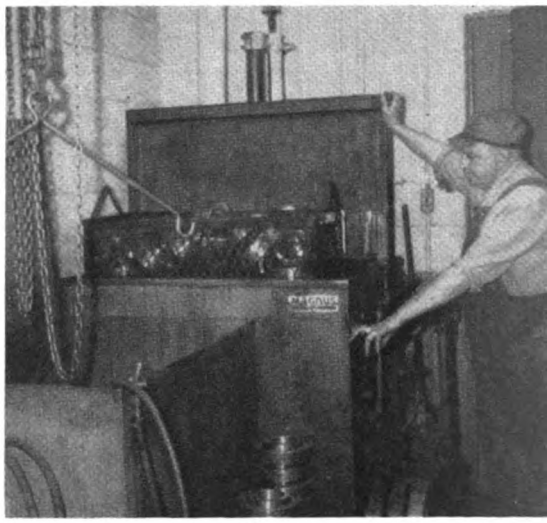
Process for rebuilding main generators is similar to that used for traction motors. Frame at left is being given insulation resistance test with motor-driven megger testing device.



duction heater is used for removing pinion ter preliminary inspection is completed.



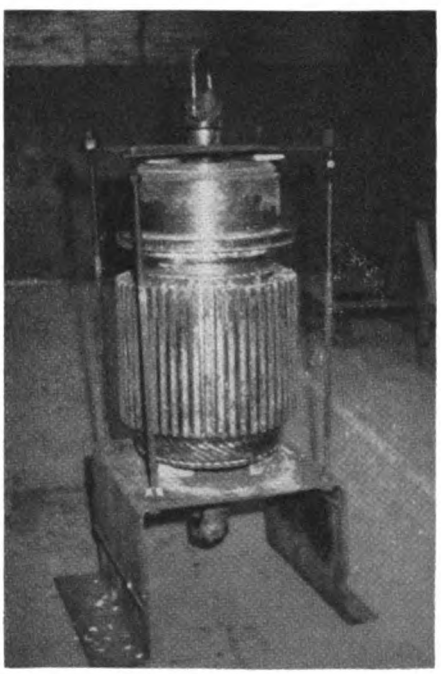
Motor is cleaned in vapor degreaser after the pinion has been removed.



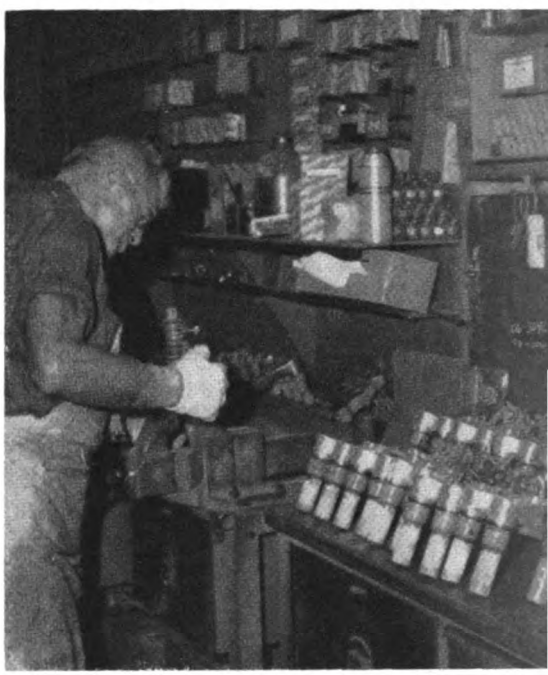
Bearings are cleaned in Magnus agitator-type cleaning tank after motor has been torn down.



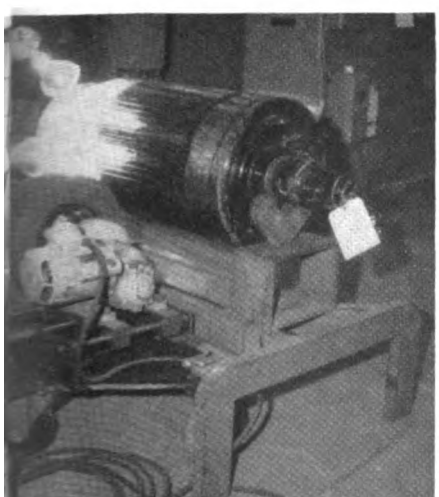
iscellaneous motor parts are cleaned in Vapor ast cabinet, then coated with rust inhibitor.



Armature core, held in jig, is immersed in lye bath to strip all epoxy after coil removal.



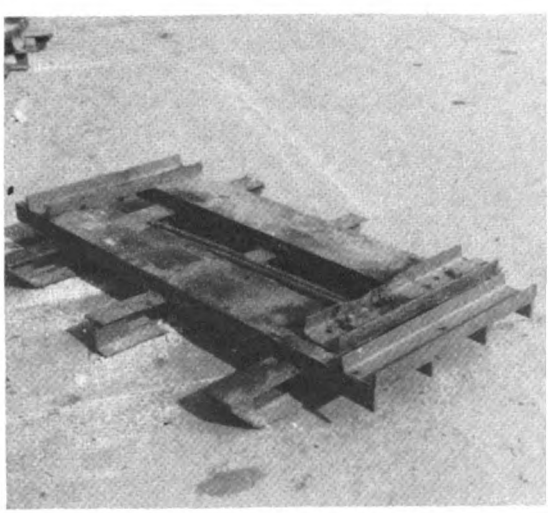
Metal portions of brush rigging are acid cleaned and polyester glass replaces porcelain studs.



claimable commutator-end steel bands are ated with epoxy and baked.



High-potential tests in the shop are all made with a direct-current type testing device.



Skid used for shipping motors can be picked up from any side by fork-lift trucks.

Doc's Governor Trouble

By Gordon Taylor

It had been a rough day at the Diesel House in Centerville. General Foreman Bob Davis concluded that surely there was nothing more which could possibly happen. There was. His clerk handed him a message telling him that CWC 36, the fast freight, would arrive shortly with trouble on its lead unit. It was thought the unit had a cracked piston, and Davis was to make preparations to take this unit off the train and replace it with another.

After checking his power board, Davis instructed one of his men to use a 1,500-hp Alco A unit as the replacement. It would be coupled on while the locomotive was being fueled. As the train pulled up at the fueling station, it proved to have a five-unit locomotive headed by an EMD F-7 A unit which was followed by an EMD F-7 B unit, two Alco B units, and an Alco A unit.

The Alco A unit being used as the replacement was ready with its engine running. It took its place at the front of the locomotive as soon as the F-7 A unit could be set out. When the Alco's control jumper was connected with the trailing F-7 B unit and the engineman opened the throttle, engine speed on the Alco became erratic. The engine began to "hunt" and the overspeed switch opened.

Foreman Davis had gone to the service track to supervise the changing of units. He immediately told one of his maintainers to try another control jumper. Trading cables made no difference; the overspeed switch continued to kick out. The Alco unit was uncouped from the train, and Davis discovered there was no overspeed trouble when the jumper cable was disconnected from the other units.

Because the maintainers could not locate the source of the Alco's trouble, another A unit was substituted and, after an hour's delay, CWC 36 left town. Foreman Davis now had the problem of finding what was wrong with his Alco A unit, as well as replacing the piston on the F-7. Looking over the list of units on hand, he found he had an Alco B unit. He instructed his men to couple the troublesome Alco A unit with it. It was of no comfort for Davis to observe that these two units worked together without difficulty. "It certainly looks as though the engine on this A unit would rather go 'hunting' than help the other units haul CWC 36," he observed. "Just put this troublemaker in the diesel house. Doc Watts, the electrical foreman, will be here in the morning and we will have him see what's wrong."

The following day when Doc Watts heard the story, he explained, "There are a number of things that can cause an Alco engine to 'hunt.' One of the principal causes can be dirty governor oil gumming the plungers and ports in the governor pilot valves so they stick. Engine speed will then go up and down continually. The governor is trying to find a balance point, but its erratic pilot valves cause it to overshoot balance points. Here we can dismiss dirt in the governor oil, because there was no trouble when the jumper cable was disconnected from the units on CWC 36. We will have to check electrical control circuits to solve this case," Doc concluded.

"I wish you would tell us how you go about analyzing a case of this kind," Bob Davis responded.

"OK," said Doc; "we will start with known facts. This unit worked OK until it was connected with the trailing units on CWC 36. It worked properly when connected with that Alco B unit. Something must be wrong on the Alco A unit which requires a jumper connection with other units to upset engine control system. But remember that when it was connected to the Alco B unit there was no trouble. This leads us to the conclusion that part of the trouble exists on the Alco A unit and another part of the trouble was due to some defective wiring condition on one of the trailing units on CWC 36.

"Let's look," continued Doc, "at part of this Alco engine control system. Its engine governor controls fuel supply to the engine and adjusts engine speed to a constant value for each position of the throttle. There is a *fixed* speed for *each* throttle position. The amount of fuel fed to the engine controls its speed. There must be some way for the correct engine speed to be indicated to the governor at each instant so it will know what to do.

"This calls for a speed signal from the engine such as might be shown by a tachometer. That signal must be transmitted automatically from the engine to the governor. This is provided by the tachometer generator which is driven directly by the engine and produces voltage that varies directly with the engine speed. The higher the engine speed, the higher the 'tac' generator voltage. The tachometer generator is a three-phase a-c generator with a permanent magnet field connected to a rectifier to produce direct current for a portion of the control circuit of the engine governor.

"There is also a special pilot valve in the governor, whose job it is to control engine speed. This is really an oil valve operated by electric current which flows through a speed coil solenoid in response to the voltage produced by the 'tac' generator. Current from the 'tac' generator flows through the speed coil solenoid to magnetize and move its core, which is connected to the stem of the pilot valve. This, in turn, opens the ports in pilot valve to admit governor oil at 120 psi pressure against the governor power piston which is linked to the fuel control racks that, in turn, are linked with fuel injector units to admit more or less fuel as load varies.

"The speed solenoid valve, which operated by current from the 'tac' generator, has its action restrained by a stabilizing coil (mounted on same frame with speed coil) which acts as an 'electric dashpot' to keep the speed coil from overshooting its mark when it is operating to increase or decrease the fuel supply to the engine. The stabilizing coil never overcomes the speed coil, but it serves as a damper to make the speed coil go easy on fuel changes. What energizes the stabilizing coil? It is energized with current from the battery. This means that a condition which interferes with the battery-to-control circuit could mean interference with the stabilizing coil and thus might upset engine speed control.

"I know that an open circuit, or

faulty winding, in the stabilizing speed coil would cause 'hunting' and could cause the overspeed switch to open. This coil could not be defective on our unit, because the governor worked properly when the jumper cable was disconnected from the trailing units on CWC 36. I would now look for grounded wiring that could provide a bypass or leakage circuit around the stabilizing coil to weaken its action. This could make the speed coil overshoot and permit the engine to overspeed.

"Facts in this case lead me to believe that a grounded condition of the positive lead, tapped from wire 71, to the stabilizing coil may be grounded on this Alco. This would cause no interference until a grounded circuit was established on the negative side of the stabilizing coil connecting with No. 4 trunk wire. Apparently it took a jumper cable connection with a unit having a grounded negative wire to complete a sneak circuit around the stabilizing coil.

"Now it is time to stop talking and make some tests to see if our theory is of any value," Doc said. "We'll start with wires that start from the engine control panel on the side wall of engine room and lead to the speed pilot valve stabilizing coil. There is more to the governor than the speed pilot valve, but let's look at the portion most likely involved."

When the circuit was carefully examined and tested, it was found that the wire feeding the stabilizing coil was "grounded" on the engine panel and had the effect of establishing a ground at what we may consider the positive end of the coil. "We don't have the units from CWC 36 to connect with this one," Doc explained, "so we'll deliberately put a test jumper between 'ground' and the No. 4 trunk wire to see what happens."

When this was done, the engine again decided to go "hunting." The mystery had been solved by Doc's clear thinking. All that remained was to clear the ground on the wire leading to the stabilizing coil and remove the temporary ground test wire from its connection with the No. 4 wire. A notice was then posted to watch for the return of the units from CWC 36 so the negative ground could be located and cleared on the faulty unit.

"Many thanks, Doc, for showing us how to talk ourselves into finding the cause of a peculiar case of trouble," Bob Davis said. Turning, he asked Electrician Bill Sparks, "What did you get from this demonstration of talking yourself into finding electrical trouble?"

"Well, sir," replied Sparks, "I learned that I should not put my tongue in gear until I get my brain started. Otherwise, I may talk myself into more trouble."

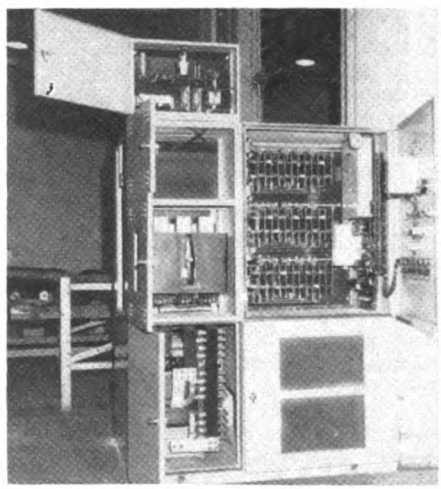
We can wrap this case up by saying that it is very important to keep control circuits free of grounds and to remember that it may require grounds on two units to establish a case of trouble on one unit. It is also good to remember that one of the best tools a trouble shooter has is a clear understanding of the functions of the equipment with which he is working. It is that understanding that accounts for his reputation as a lucky trouble shooter.

Rectifier for Clinchfield Shop Power

Silicon rectifiers are of growing importance in the supply of d-c power. A 00-kw Allis-Chalmers unit was recently installed in the Erwin, Tenn., hop of the Clinchfield. This was part of a shop modernization program which was undertaken by the road several years ago. During the course of this work, the steam heating systems or the railroad's buildings at Erwin were rearranged to make their operation more economical. Latest step in this drive for greater efficiency was the installation of the solid-state rectifier to supply power for shop cranes and other d-c machines.

In 1958, a central heating system, consisting of two oil-fired, automatic steam generators, was installed to heat the Erwin shop, the general office building, and the passenger station. This made possible the retirement of two hand-fired boilers in the hop powerhouse, one stoker-fired boiler in the general office building, and one stoker-fired furnace in the station. The change produced labor savings of approximately $15,000 annually.

Although the Clinchfield receives its a-c power from the TVA system



Rectifier unit is installed in shop building.

and its d-c power generation has not involved the use of steam for a number of years, it was necessary to retain a powerhouse attendant to operate the motor-generator sets used to produce direct current for overhead cranes and other shop machinery.

The new rectifier has now replaced the motor generator sets. The package unit requires no special foundation and has been located in the main shop, near the load center. The d-c power is transmitted for only short distances. The unit is air cooled, which simplified the installation. There are few auxiliary devices, a feature contributing to reduced maintenance.

The 300-kw unit is equipped with a regenerative load absorbing device that protects against a rising bus voltage. This regenerative unit throws resistance across the line and cuts in and out automatically at pre-set levels of bus voltage and current.

Diode balancing reactors make it necessary to use matched cells. Fast current limiting fuses assure immediate isolation of a faulted cell without interruption of the d-c output. A primary circuit breaker provides quick fault protection and positive overcurrent protection. The silicon diodes have an almost unlimited life when operated within their current ratings. Such silicon rectifiers are 85 to 97% efficient and between 25 and 100% load.

In addition to the efficiency and dependability with which d-c power is now produced, the completely automatic operation of this unit is producing labor savings of $5,000 annually.

The A's Have It

(Continued from page 34)

On a trailing locomotive with the F-1 selector valve positioned *Trail 6* or *26,* the protection-spool valve will vent air from the chamber below the right-hand spool valve which will be forced by spring pressure to its lower position, as in *Lead* position to connect ports 4 and 16. Control air pressure developed by the 26F control valve is transferred to the relay valve control pipe as it is on a lead locomotive, actuating the relay valve to cause an emergency brake application on the trailing unit.

Recovering Control

If a break-in-two should occur between two units, locate its cause and make repairs which will close all the open pipes. Because the brake-pipe air on top of the H-B-5 Relayair valve diaphragm and in the 90-cu in. reservoir has been drained to zero, the Relayair valve moves to its upper position, cutting off main reservoir supply in port 12 to port 11. This cuts off flow of air to the sanders, to port 10 of the H-5-A Relayair valve, and to port 53 of the brake valve.

Air on top of the H-5-A Relayair diaphragm will flow to atmosphere via pipe 53 and a choke in the brake valve. Air behind the brake valve cut-off valve will also flow through the same choke to atmosphere. The piston of the H-5-A Relayair valve will move to its upper position, cutting off the flow of air to atmosphere from the P-2A brake application valve spring chamber and timing reservoir.

To reset the P-2A brake application valve to restore the PC and dynamic cut-off switches, the brake-valve handle is placed in *Suppression* position. This will prevent the exhausting of air from port 8 of the P-2A brake-application valve. Air from the top of the release control valve portion of the P-2A brake-application valve and port 33 of the P-2A brake-application valve will flow to port 3 of the brake valve and to atmosphere through the suppression spool valve.

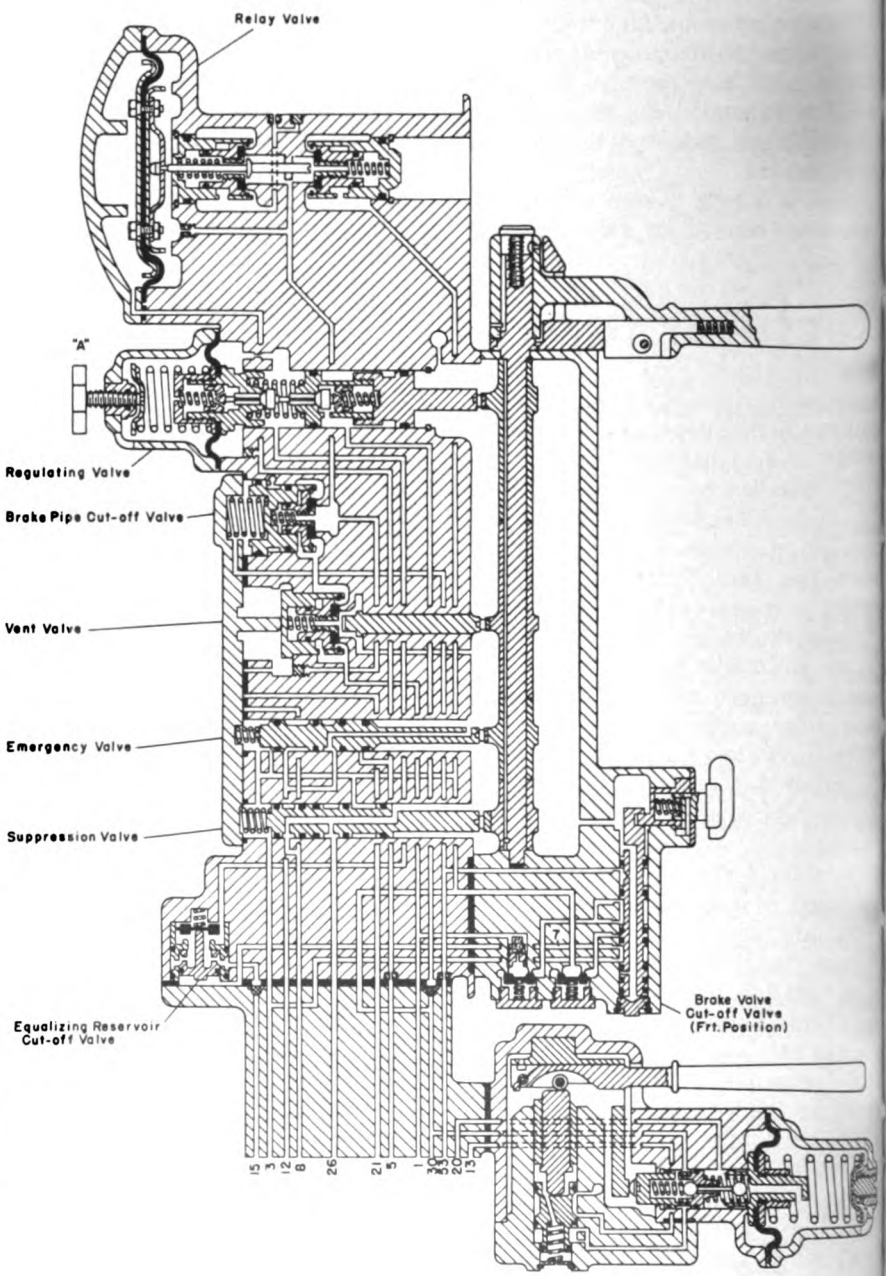
Main reservoir supply in pipe 30 of the P-2A brake-application valve will charge the spring chamber and the timing reservoir and also supply air to the chamber under the release control valve, moving the release control valve to its uppermost position. This positively cuts off feed from pipe 15, the equalizing charging pipe, to pipe 5 and prevents undesired recharge of the equalizing reservoir. This prevents partial release of the brakes in passenger service.

With the spring chamber of the P-2A brake-application valve charged, the application valve will move down to its release position, disconnecting ports 30 from 25 and connecting port 25 to exhaust. Air on the PC and dynamic cut-off switches will flow to atmosphere and allow the switches to reset. Ports 5 and 24A are disconnected. Port 24 and the reduction limiting reservoir are connected to exhaust.

Moving the brake-valve handle to *Running* position, air in pipe 8 and at the bottom of the release control valve will flow to atmosphere through the suppression valve. Main reservoir supply from port 3 in the brake valve to port 33 in the P-2A brake-application valve will flow to the chamber on top of the release control valve, moving the release control valve down, allow equalizing charging pipe 15 to connect with equalizing reservoir pipe 5, and charging the equalizing reservoir. The brakes will then release.

George asked Ken and Slim if there were any questions. Slim replied, "Don't worry; we will be back again. Rome wasn't built in one day."

On the way back to their office, Ken said, "George really knows his brakes. We'd better get rid of all the P-2 application valves on passenger locomotives and apply the P-2A valves."



26-C control valve is designed to be flush-mounted on the locomotive control panel.

What's New

(*Continued from page 11*)

o furnish a continuous supply of oil to the ntire pad length. The outer cover is oil-bsorbent lint free tufting. The foam rub-er core is said to have the required re-iliency at subzero temperatures. The lu-ricator is AAR approved for test applica-ion in interchange. *Spring Packing Corp., Dept. RA, 332 S. Michigan Ave., Chicago 4.*



ortable Sandblaster

he Handi-Blast portable sandblaster cleans ement, rust, and paint from tools and quipment, leaving a clean, dry etched sur-ace that provides an excellent bond for ew paint. The unit requires no more air han a production spray gun. It has an ver-all height of 23 in. and a tank diameter f 7 in. Weight is 23 lb empty, with a ca-acity of 30 lb of abrasives in the 20 to 00 mesh size. Each unit is tested at 300 si. Air is consumed at the rate of approx-nately 8 cu ft per min, using the $^{3}/_{32}$ in. ozzle and the air supply from a 2 hp com-ressor. A $^{5}/_{32}$ in. nozzle will consume pproximately 20 cu ft per min, requiring n air supply from a 5-hp compressor. *'andi-Blast Div., Hamill Manufacturing 'o., Dept. RLC, Washington, Mich.*

abricating Tool

lost Heliarc (Tig) welding torches, in-uding those in service, may now be used oth for welding and cutting. Complete ibrication, from cutting of metal to final welding into a finished product, can now be accomplished with a single torch. Either manual operation or mechanized fixturing may be used. Cutting is done by increasing current density above that for good welding conditions, utilizing Linde argon-hydrogen shielding mixtures. Normal gas flow rates (40-60 cfh) are sufficient to transfer energy across the arc and displace the molten metal. Any standard d-c power equipment with a 70-volt open circuit may be used for Heliarc cutting of metals within a range of ⅛ to ½ in. thick. Typical cutting speeds are 40-60 ipm on ⅛-in. aluminum and 20-40 ipm on ⅛-in. stainless steel, using H-35 shielding gas. *Linde Co., Division of Union Carbide Corp., Dept. RLC, 270 Park ave., New York 17.*

WANTED: Surplus or used, E.M.D. injector plunger & bushing assemblies #5227853, #5228236 .421 diameter, GM-DD Series 110 plunger & bushings and parts. Rail, 2093 East 19 Street, Cleveland 15, Ohio.

Letters

(*Continued from page 7*)

The following are significant excerpts from the conclusions reached as a result of these tests:

"When considering the total oil consumed (including oil lost in all tests with 1-in. to 0-in. to 1 in. oil levels, the roll waste packing showed the lowest consumption of oil. When considering the total oil consumed (including oil lost) in all tests with from ½-in. to 0-in. to ½-in. oil levels, the average oil consumed per box with lubricators was less than that consumed with roll waste packing, and five of the seven lubricators showed less oil consumption than roll waste packing."

"There was no abnormal increase in the journal-bearing temperature when the tests were conducted with free oil levels of ½ in. or lower."

"The results obtained in this test indicate that we could expect a 55% reduction in the amount of oil lost and consumed in lubrication by lowering the free oil level in the bottom of the journal boxes from a level of 1 in. maximum to a level of ½ in. maximum."

The actual data obtained during these tests showed that the average oil consumption per mile per box during nine tests with free oil in the journal box from 1 in. to 0 in. and back again to 1 in. in ¼ in. increments was .0069 oz for the boxes with the seven lubricators compared with .0036 oz for the roll-packed boxes. For the five tests with free oil levels from ½ in. to 0 in. and back to ½ in. in ¼-in. increments, the average consumption of oil for the boxes with the seven lubricators was .0031 oz per mile per box compared with .0033 oz with the roll-packed boxes.

From the above data it may be observed that, for boxes equipped with journal lubricators with free-oil level maintained at not more than ½ in., the oil consumption actually is lower than for roll-waste packed boxes maintained at either 1 in. or ½ in. maximum free-oil level. It, therefore, appears that the answer to the problem is available and that, in essence, the problem is one of avoiding over-oiling of journal boxes equipped with lubricator pads.

M. A. Pinney
Engineer of tests, Pennsylvania

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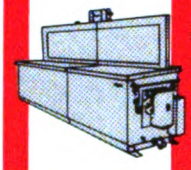
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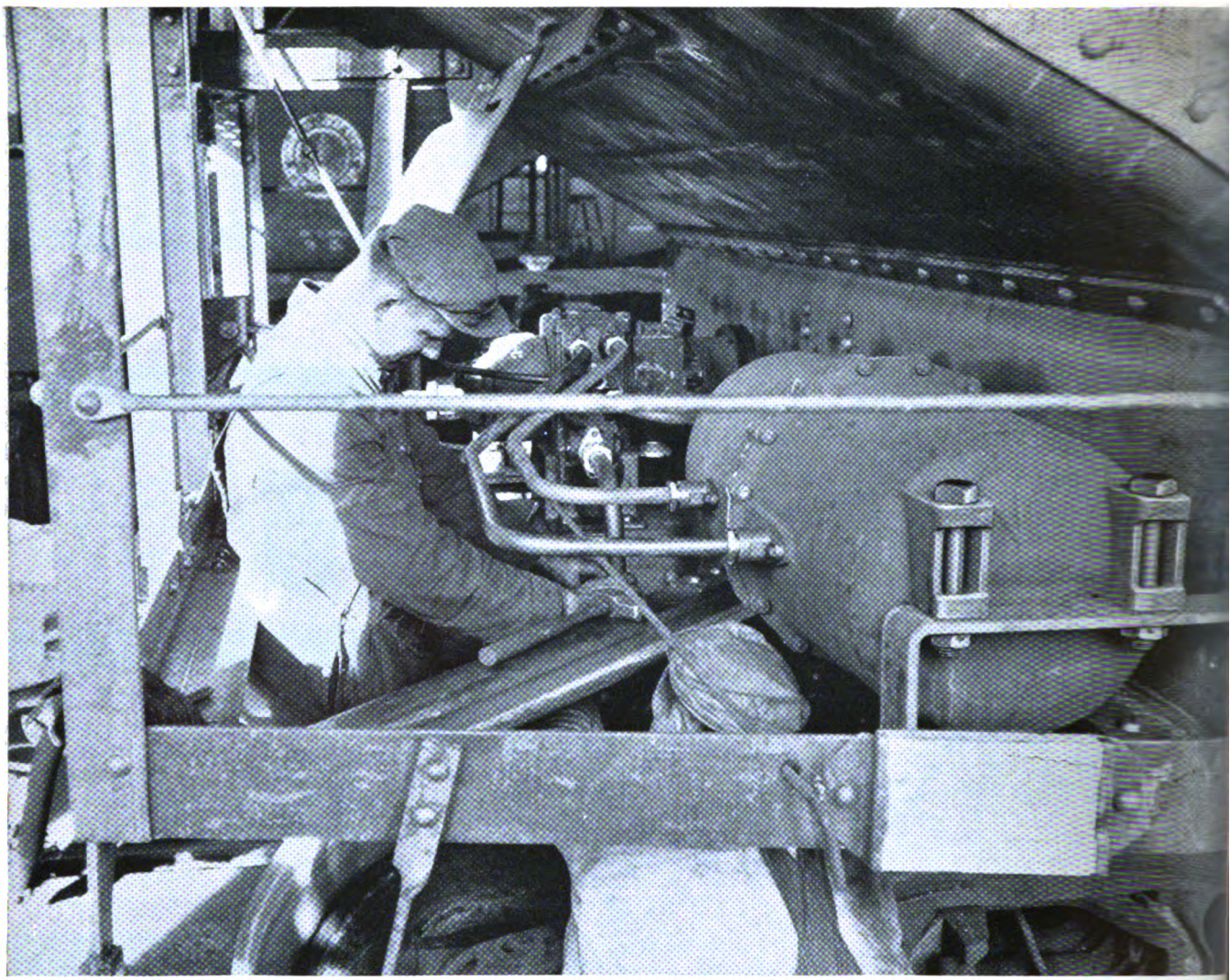
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ersonal Mention

esapeake & Ohio.—*Huntington, W. Va.:* LO F. MELROSE appointed engineer of ts, succeeding C. M. ANGEL, retired.

nver & Rio Grande Western.—*Salt Lake y, Utah:* PAUL D. STARR, appointed ister mechanic, succeeding EARL FISHER, ired. Mr. Starr formerly electrical engi- er at Denver, Colo.

in, Joliet & Eastern.—*Gary, Ind.:* JAMES BODINE appointed enginehouse foreman, rk yard. VINCENT R. NELSON appointed ief enginhouse foreman, Kirk yard.

sco.—*Springfield, Mo.:* L. I. BUFFINGTON pointed assistant to chief mechanical of- er.

w York Central. — *Weehawken, N. J.:* HARLES W. COLE appointed master me- anic. *Syracuse, N. Y.:* DONALD A. SWAN- N appointed district car inspector, suc- eding Mr. Cole. Formerly district car in- ector at Cleveland.



R. M. Pilcher

orfolk & Western.—*Roanoke, Va.:* ROBERT . PILCHER, assistant engineer of tests, ap- inted engineer of tests, succeeding I. N. OSELEY, retired research and test engineer. Mr. Pilcher worked in Roanoke shops ile attending VPI from 1918 through 23. He became a special apprentice in e shops in 1926; shop inspector in 1928, d assistant engineer of tests in 1929.

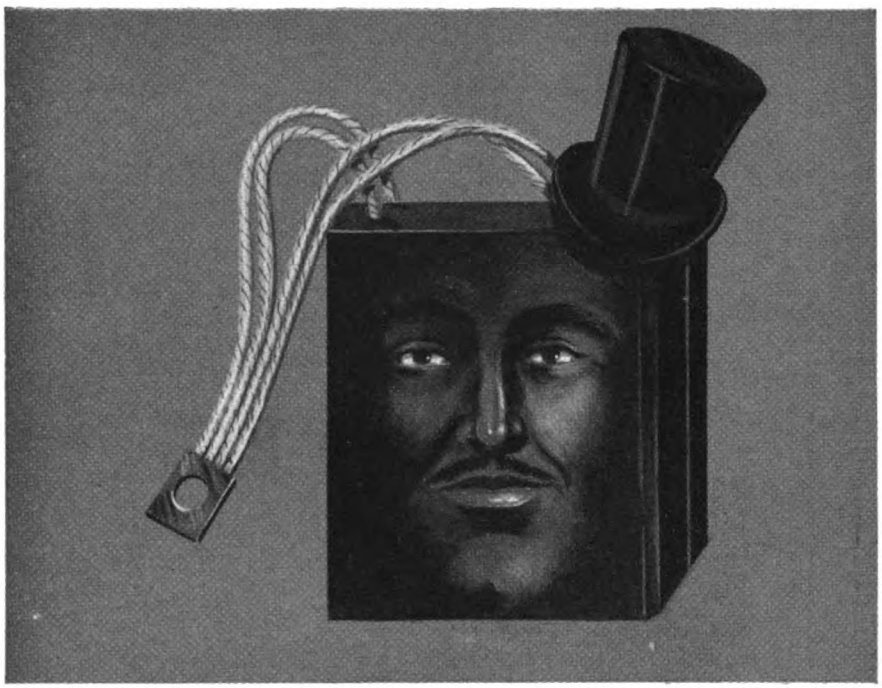
nnsylvania. — *Philadelphia, Pa.:* N. L. SHOP appointed assistant road foreman engines. *Enola, Pa.:* H. E. BRITE ap- inted assistant road foreman of engines. *agerstown, Md.:* E. L. PRICE appointed otive-power foreman.

chmond, Fredericksburg & Potomac.—*Rich- ond, Va.:* HARTWELL T. RAINEY, JR., perintendent motive power and equip- ent, appointed chief mechanical officer.

uthern. — *Atlanta, Ga.:* WILLIAM H. LETCHER appointed general foreman car pairs. Formerly general foreman at Mon- e, Va.

abash.—*Decatur, Ill.:* B. J. PAYNE, gen- al superintendent motive power, ap- inted manager—motive power and car uipment. A. L. VEITH, assistant general perintendent motive power, appointed as- stant manager—motive power and car uipment. E. EAGLETON, car shop super- tendent, appointed superintendent car uipment. R. N. FOSTER, assistant to gen- al superintendent motive power, ap- inted mechanical engineer. H. C. STOREY

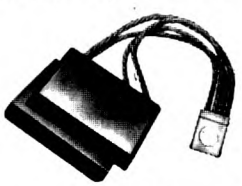
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appointed general foreman, car shops, *Montpelier, Ohio:* A. T. SCHERER appointed master mechanic. *Owosso, Mich.:* H. L. WINGFIELD appointed master mechanic, *Moberly, Mo.:* W. C. HALL appointed assistant master mechanic. *Chicago:* W. J. LAFFERTY appointed general car and locomotive foreman.

White Pass & Yukon Route. — *Skagway, Alaska:* G. G. POE appointed master mechanic.

Supply Trade Notes

SHERWIN-WILLIAMS CO. — *E. Courtney Baldwin,* vice-president and general manager, elected president, succeeding *Arthur W. Steudel,* now chairman of the board and chief executive officer.

■

AIR REDUCTION SALES CO. — *A. J. Blodget, Jr.,* appointed regional vice-president, Midwestern Region, Chicago, succeeding *D. D. Spoor,* retired.

■

TOWNSEND CO.—*P. F. Barry,* appointed assistant sales manager, Engineered Fasteners Division, Ellwood City, Pa. *R. M. Thompson,* sales office manager at Chicago, appointed eastern district sales manager at Philadelphia, Pa., succeeding Mr. Barry.

■

WINE RAILWAY APPLIANCE CO., DIVISION OF UNITCAST CORP. — *Robert M. Close,* St. Louis Railway Supply Co., appointed agent in St. Louis, Central and Southwestern territories.

■

VASCOLOY - RAMET. — Following appointed sales agents for railroad tooling: *T. C. Johnson Co.,* Chagrin Falls, Ohio; *Ross Co.,* St. Louis; *Harbil, Inc.,* Chicago; *R. Lightfoot,* Louisville, Ky., and *Mountain Region Supply,* Omaha, Neb. Newly appointed distributors for railroad tooling, *Tool Supply Co.,* Minneapolis, Minn., and *Kirk-Wiklund & Co.,* Kansas City, Mo.

■

BUDD CO. — *Joseph F. Clary* appointed vice-president sales, Railway Division, Philadelphia, Pa. Formerly a divisional vice president in charge of Western region railway sales.

■

BUFFALO BRAKE CO.—*D. F. Gladwell,* engineer, appointed chief engineer, New York.

■

WHITING CORP.—*T. R. Elmblad* and *A. C. Kukral* appointed manager New York Domestic and Cleveland sales offices, respectively.

■

ARMSTRONG CORK CO.—*A. J. Sloss,* manager of industrial adhesive sales, appointed manager of new Railroad Adhesive Sales department.

■

AMERICAN BRAKE SHOE CO.—*Chester P. Corrigan* appointed sales manager, Railroad Products Division, Central Region, succeeding *R. L. Robinson,* retired. Headquarters, Chicago. Mr. Corrigan previously district sales manager in Eastern Region.

ANDARD RAILWAY EQUIPMENT V., STANRAY CORP.—*James S. Swann,* ief product engineer, appointed director newly formed Transportation Equipment search Group.



R. Lindenhayen, Jr.

ATIONAL CARBON CO., DIVISION OF ION CARBIDE CORP.—*Rolf Lindenhayen,* , named western division manager, brush d railroad products at San Francisco.

■

ENERAL STEEL CASTINGS CORP.— *Ashley Gray, Jr.,* vice-president railroad es, named vice-president and assistant to president, with responsibilities at execu- e management level. *Howard F. Park,* , continues as vice-president sales. *omas C. Barton* named manager western es. At Eddystone, Pa., *Delancey J. Davis* pointed general manager; *Robert Weth- ll, III,* works manager; *Frank W. Tolan,* nager eastern sales, and *Clemson N. ge,* district manager railroad sales.

■

. LOUIS CAR CO., SUBSIDIARY OF GEN- AL STEEL CASTINGS CORP.—*James Mac- nald* named senior vice-president and *nthrop B. Reed,* vice-president. Both vice-presidents of General Steel. *J. W. oke* named vice-president, continuing also assistant vice-president of General Steel. *win B. Meissner, Jr.,* continues as pres- nt of St. Louis Car.

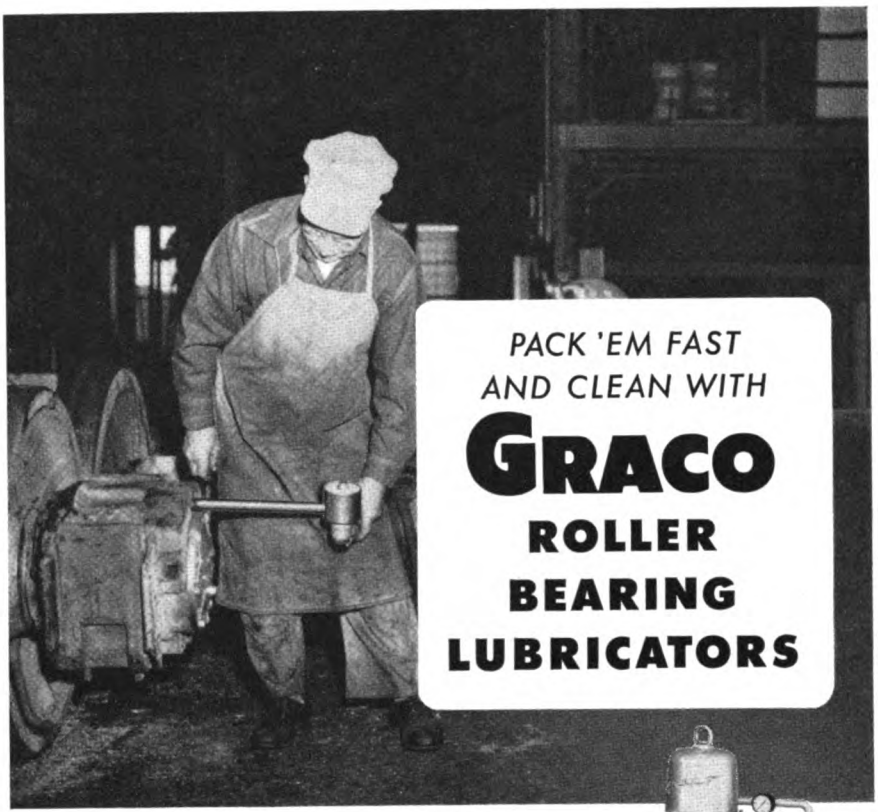
lelps from Manufacturers

following compilation of literature—in- ding pamphlets and data sheets—is offered e to railroad men by manufacturers to the road industry. To receive the desired in- mation write direct to the manufacturer.

RE AND CABLE. Bulletin discusses onite Del diesel-electric locomotive wire ple, with dimensional charts both for ided and non-braided constructions. rite: *Okonite Co., Subsidiary of Kenne- t Copper Corp.,* Dept. RLC, 220 Passaic Passaic, N. J.)

HESIVES. 12-page catalog (A-ZBD- 4-JR) contains eight fold-out tables list- uses, characteristics and general prop- ies of over 170 different adhesives, coat- s and sealers. (Write: *Adhesives, Coat- s and Sealers Div., Minnesota Mining Manufacturing Co.,* Dept. RLC, 900 sh ave., St. Paul 6, Minn.)

SE STYLE SELECTION. Bulletin 627 a Guide for Selecting the Aeroquip Hose le to use with 112 common agents. rite: *Aeroquip Corp.,* Dept. RLC, Jack- n, Mich.)

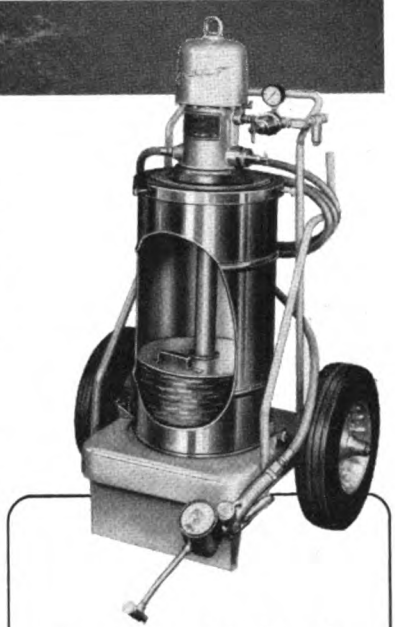


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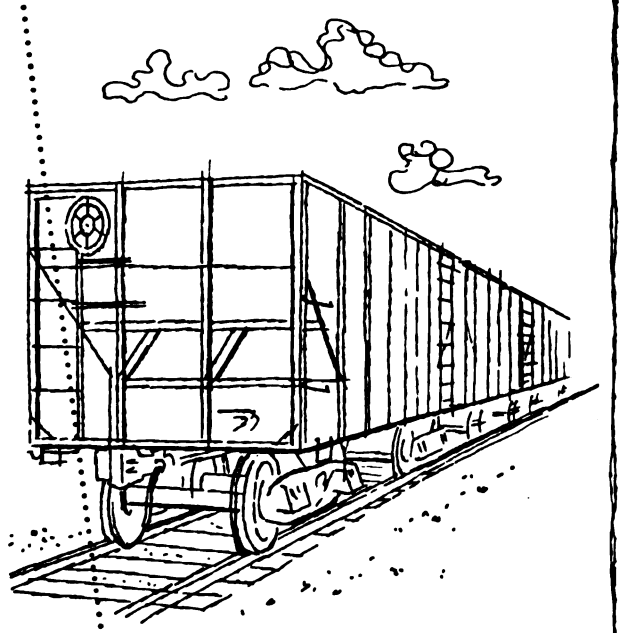
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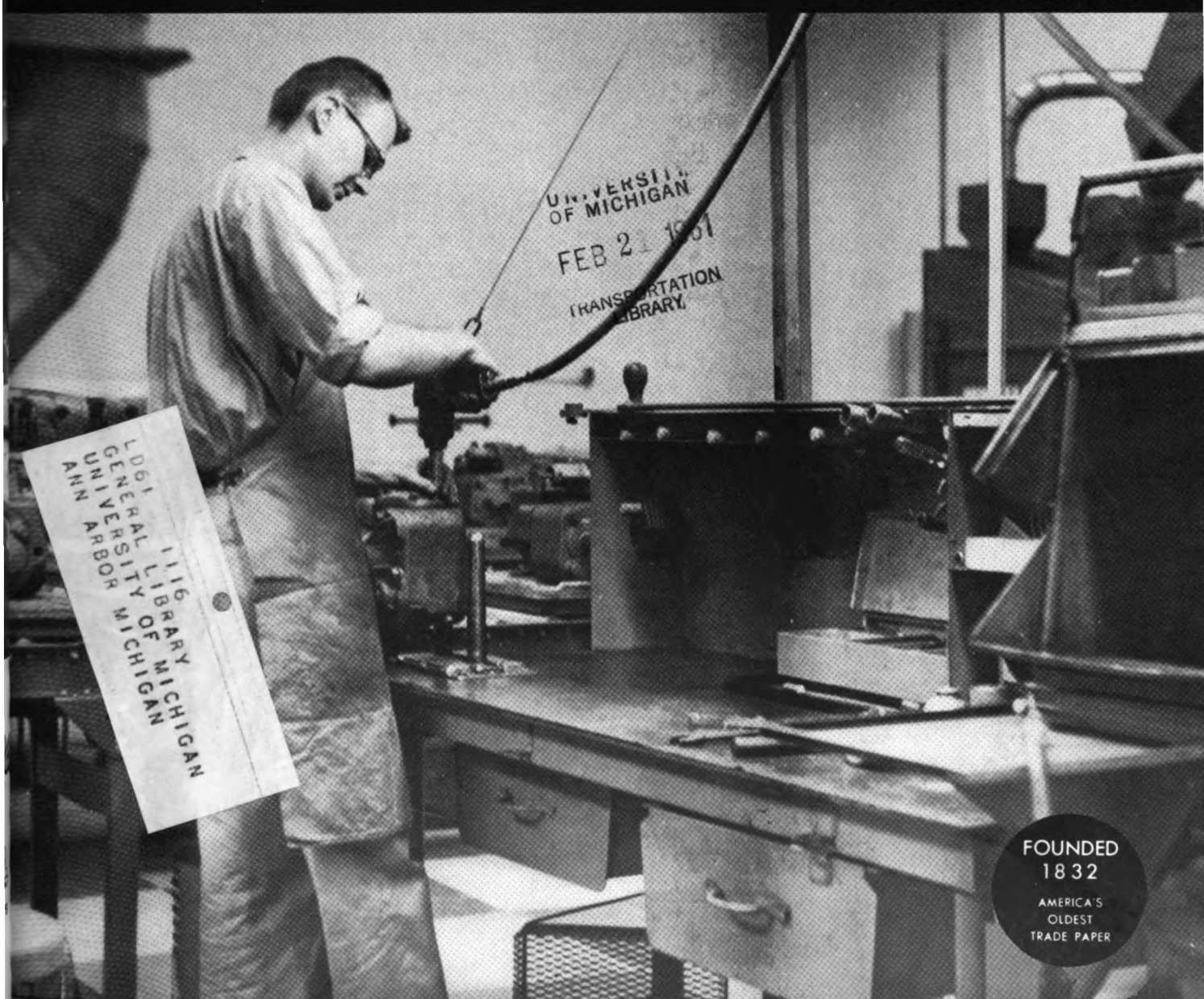
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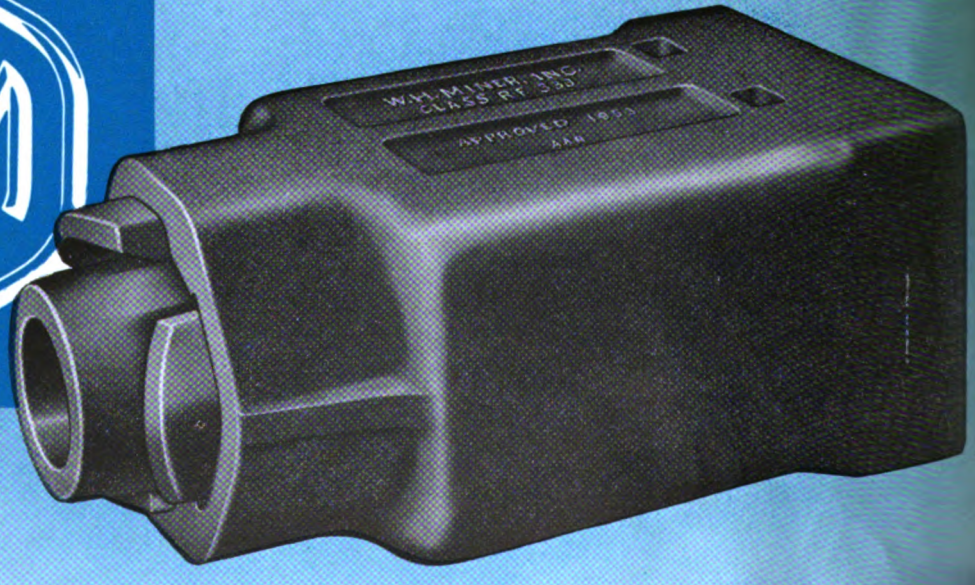
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Northern 'Streamlines' Brake Overhaul . . . page 17

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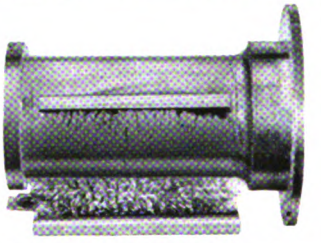
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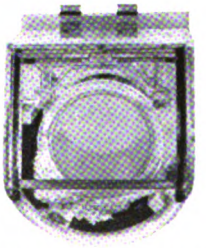


Design assures full length journal contact.

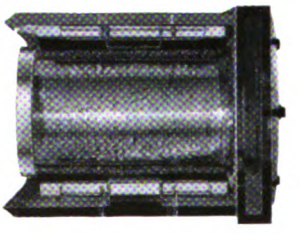
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*With the lubricator in position in the journal box, there is a wedge-shaped "pocket" on each side between the felt base and the pad where dirt is deposited. Action of the tufts on either side of the journal tends to shake away particles of loose dirt from the lubricator and into the pocket.

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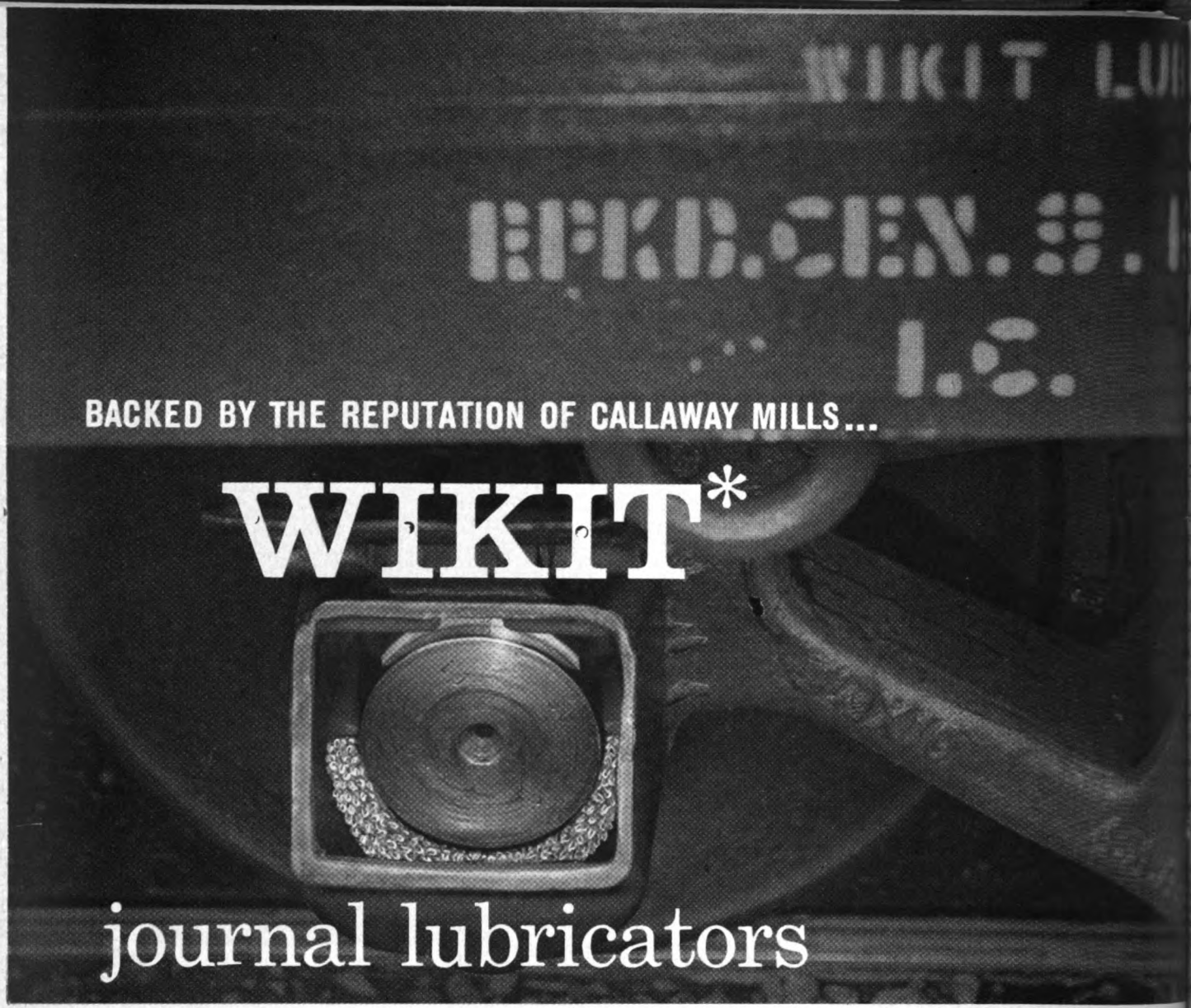


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Center wick design provides shortest and most direct oil flow to journal. LOOP-TITE* jacket, woven by a special process, has interlocking loop pile with high tensile strength. Over-all design assures rapid, multi-feed wicking throughout lubricator.

ABSORBenized* treatment of jacket provides greatest wicking and absorbency—a special process featured in famous Callaway bath towels.

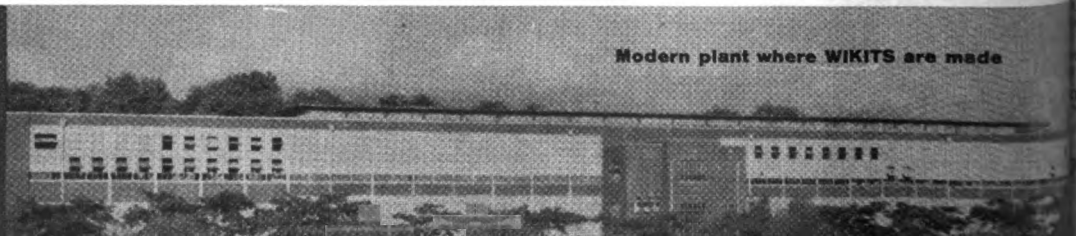
WIKIT #11 retains 7 pints of oil after saturation and draining 3 hours. Cores are best quality neoprene foam—resistant to oil, moisture, heat, compression set. Strong nylon tape secures ferrous pull handle. Insert either end first, either side up!

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REPORT FOR FEBRUARY

Allied Will Exhibit During Coordinated Meetings

Exhibits will be held by the Allied Railway Supply Association in conjunction with next September's Coordinated Mechanical Associations meetings in Chicago. This decision was the result of a ballot of ARSA members taken following the cancellation of the 1961 meeting of the AAR Purchases and Stores Division which was scheduled to be held immediately after the three-day session of the Coordinated groups. Proposal to hold the exhibit won by an "overwhelming majority."

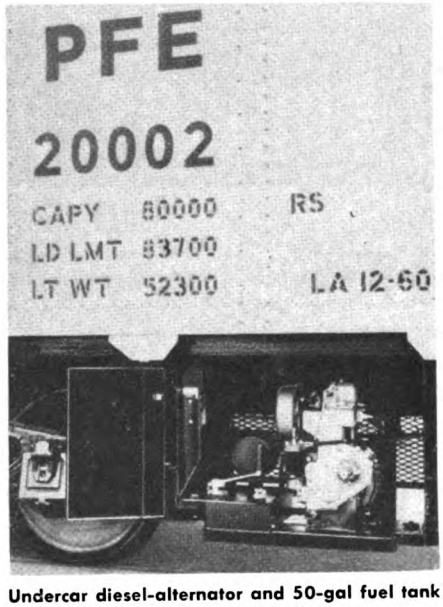
While original plans called for a five-day exhibit, new plans will have the displays coincide with the Coordinated meetings on September 11, 12, and 13. Coordinated Associations—Air Brake, Car Department Officers, Locomotive Maintenance Officers, and Railway Fuel and Operating Officers—will meet in the Hotel Sherman as they have in the past.

The ARSA exhibits will be held in the Hotel Sherman and at a track location on the Illinois Central. This track exhibit will be in the IC 31st Street yards where 5,000 ft of track space will be available. Free bus transportation will be provided between the Sherman and the IC yard on a regular schedule

PFE Rebuilds Have 'Ice-Tempco' System

Pacific Fruit Express is now equipping 500 ice-bunker refrigerator cars with its Ice-Tempco constantly operating, air-circulating fan system. This is the Cargotemp automatic temperature control system developed by Preco, Inc. (RL&C, May 1958, p 18). Installations are being made in PFE's car shops at Los Angeles, Calif, in conjunction with general repairs to the cars.

The modified cars, to be known as Ice-Tempco cars, are 40-ft ice-bunker cars with 4 in. of insulation. One ice bunker will be removed from each car and the remaining bunker enlarged to hold in excess of 7,000 lb of ice, increasing cubical loading capacity by about 10%.



Undercar diesel-alternator and 50-gal fuel tank are features of Ice-Tempco installation.

A 5-hp diesel alternator is installed under each car, along with a tank holding a 15-day fuel supply. The generating plant operates the four fans in the bunker end of the car, one serving as a "circulating fan" and the other three serving as "cooling fans." The circulating fan operates continuously and pulls air from the lading space up through a by-pass duct in the bunker bulkhead. Cooling fans operate at a fixed speed until temperature of air in contact with the thermostat in the bunker by-pass duct has

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TIME SAVING IDEAS FOR FEBRUARY

MOTIVE POWER AND CAR

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ELECTRICAL

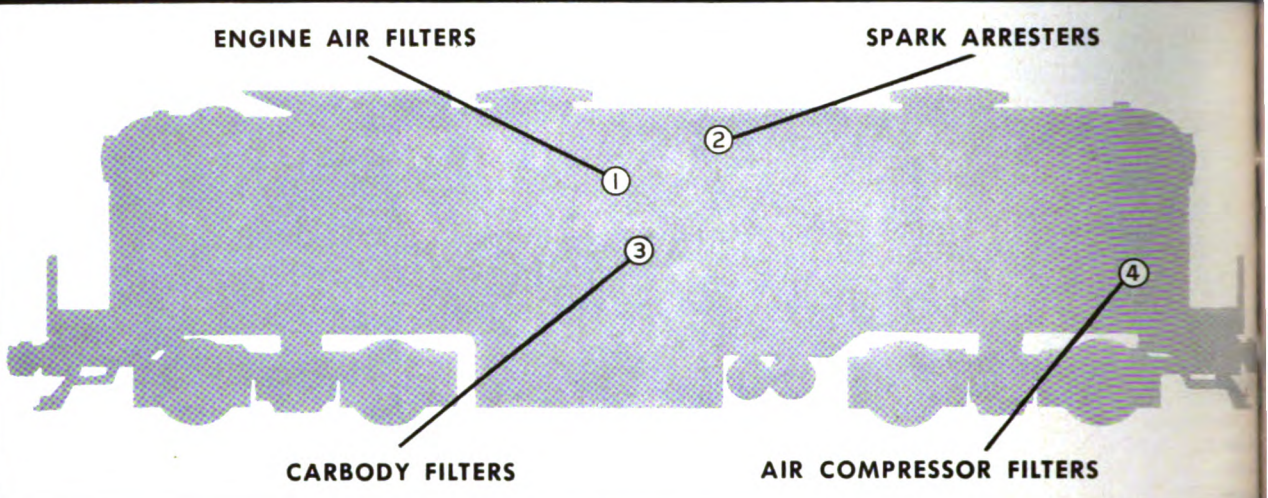
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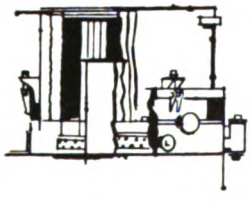
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Whether you or the manufacturer rebuilds your locomotives, be sure to specify and use Air-Maze filtration products. Thirty-five years of filtration experience assures the Railroad Industry of maximum performance.

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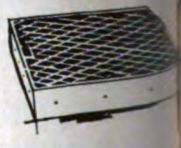
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(2) SPARK ARRESTERS



Designed for EMD and EM manifolds . . . utilizes principle of centrifuging incandescent particles to reduce particle size prior to leaving exhaust stack.

(3) CARBODY FILTERS



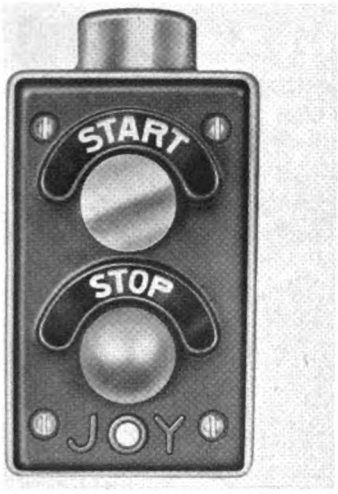
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Cut compressor wear . . . simple installation and servicing . . . available for all compressor models.

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Push-Button Station

The Flexitite switch is a heavy duty push-button station of corrosion-proof, all-rubber, weather-sealed construction. It is recommended for any two-station push-button application, such as start-stop, up-down, forward-reverse, off-on, etc., and fits all standard FS and FD boxes. It meets NEMA types 1, 4 and 5 enclosure requirements. *Joy Manufacturing Co., Electrical Products Division, Dept. RLC, 1201 Macklind ave., St. Louis 10, Mo.*



Insulation Panels

Trefoam insulation panels of rigid foamed polyurethane, with waterproof plywood faces and aluminum foil backs, are said to provide high thermal efficiency in the insulation of refrigerated trucks and railroad cars. The panels interlock for airtight construction. Shiplap joints give 6 in. of sealing surface between each panel. The panels have a "U" factor less than half that of conventional insulated structures and are impervious to air, preventing loss of refrigeration and accumulation of moisture. The panels are self-supporting. They are installed by floating the inner body in place without bolts, braces, or any other heat conductor running from the outer frame through the insulation. Floor panels are faced with ½ in. plywood to compensate for additional strain on floor. When in place, the panels are bound permanently and become an integral part of the body. Internal support members of special finishes can be added to the structure for special requirements. When properly installed, the panels conform with the AFDOUS code, which recommends zero or below as applied to frozen food transportation equipment.

Standard panels are 4 x 7 and 4 x 8 ft, and thicknesses, 3½ and 5¾ in. Facing material can be aluminum, stainless steel, reinforced fiber glass, or other specification, in addition to waterproofed plywood. *Urefoam Corp., Dept. RLC, Camden, N. J.*



Impactools

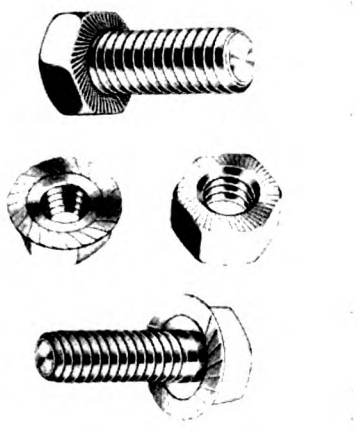
Snapping on a different pre-set torsion bar changes the torque delivered by either of two new torque-control Impactools. Each is available with heavy and light detachable torsion bars. The light torsion bar for the 5040TD tool may be set for torques from 20 to 50 ft-lb, while the heavy torsion bar covers from 45 to 90 ft-lb, giving a range of 20 to 90 ft-lb. For the 5020TD tool, bars may be set for 6 to 17 ft-lb and 10 to 30 ft-lb, covering a range of 6 to 30 ft-lb. Both tools shut off automatically when the pre-set torque of the torsion bar in use is reached. Size 5020TD is 11 in long and weighs 4 3/16 lb with torsion bar. Size 5040-TD is 12⅞ in. long and weighs 7 lb. *Ingersoll-Rand Co., Dept. RLC, 11 Broadway, New York 4.*

Plastic Coating for Car Journals

Savings of 30 to 50 cents each in the cost of cleaning freight-car journals are said to be possible through the use of Freight Liner Plasta-Gard, an all-weather strippable plastic coating. The plastic can be brushed or sprayed onto journals, diesel valves, drive shafts, and other machined metal surfaces needing protection against rust and corrosion. The material is said to stay flexible and strippable permanently and peel off easily even after long exposure to sub-zero cold or intense sunlight. It can be applied at any temperature, two coats drying to touch in 5 to 10 min. One gallon gives two-coat protection for about 60 journals. *Freight Liner Dept., Archer-Daniels-Midland Co., Dept. RLC, 732 Investors Bldg., Minneapolis 2, Minn.*

Cold Tank Concentrated Stripper

Stripzit is a heavy duty, single-phase stripper composed of 100% active ingredients designed to strip the hardest deposits from all metals, including aluminum and magnesium. It is said to be completely effective for quick, safe cleaning of carburetors, rings, pistons, fuel pumps, cylinder heads and small tools, and for stripping paint guns. It is useful as a fuel tank desealant and for circulating in pipelines to remove carbon sludge and heavy baked-on residues. *Sea-Air Chemical Corp., Dept. RLC, 32-00 Borden ave., Long Island City 1, N. Y.*



Locking Screws and Nuts

The Whiz-Lock, according to the manufacturer, has the easy spin-on application of the common nut and gives uniform tension throughout an assembly. The bearing face both of the screw and the nut has a series of spiral serrations on a convex base that takes a firm grip when the nut is tightened. Up to 50% more effort, it is said, is needed to remove a Whiz-Lock than is needed to apply it. A flange nut or flange screw can be specified for oversized holes where bearing surface is limited. *MacLean-Fogg Lock Nut Co., Dept. RLC, 5535 W. Wolcott ave., Chicago 40.*

EDITORIALS

Calamity or Opportunity?

The curtailment of Association of American Railroads activities was necessitated by lack of money to support them. This will cause many hardships, among which the curtailment of research work is particularly unfortunate. With the reduction of personal contacts made when groups get together, some of the advantages which come from exchange of ideas will be lost. Fortunately, the Coordinated Mechanical Associations will continue to get together and will carry on with the immediate needs of current mechanical department operating and maintenance requirements.

The Electrical Section was disbanded, and some of its members are inclined to consider it as a calamity. For years they worked to build it into a well-planned organization which did much good work. "Now," they say, "we are back where we started." That raises the questions—where did they start, where are they now, and where can they go?

Back in 1908, before electric headlights were mandatory and oil headlights were used extensively, electricity on the railroads consisted for the most part of some very simple car lighting and a little shop power and light. Portable lights were largely kerosene torches. Even then there was need for some means of comparing notes and establishing practices. This need was met by the creation of an independent body organized as the Railway Car Lighting Engineers. In 1910 it was renamed the Association of Railway Electrical Engineers. In 1937 it became the Electrical Section of the Mechanical Division, AAR. In 1952, it combined with the Electrical Section of the Engineering Division to serve both divisions.

Now the Electrical Section has been dissolved and it is proposed that, so far as the mechanical departments are concerned, they function as a Committee on Electrical Equipment—Rolling Stock and, perhaps, in other capacities.

This does not provide for electrical men in the Engineering department. Some of its former members seeking greater unification, have suggested that all things electrical including signals and communications be combined. This would have some advantages, but it would introduce many complications and would tend to perpetuate a basic fault; namely that of complication. Electrical devices are used in all branches of railroading and the word electricity can no longer mark the point of cleavage. There is little similarity between an analog computer and a diesel locomotive generator.

It is logical for a man who has come up through the mechanical department to think in terms of things mechanical with the result that economic planning often receives secondary consideration. Making the thing work is of first importance. Somewhat similarly, electrical men are inclined to tout electrical means and equipment to the exclusion of other means which may be better suited to the circumstances. Also it becomes almost a habit to hide behind a mask of technique, when that is possible, to emphasize the importance of the electrical department.

Now we are going through a period of transition in which, for a brief period at least, the importance of departmental prestige, be it mechanical or electrical, should be of secondary importance. By and large, the railroads are on a spot, and the man who gives attention to the economics involved is the one of greatest value to his railroad and to himself.

Electrical equipment is now a major component in railroad operation and who is responsible for it is a matter of both training and personality. It is up to the one who wants position to accept broad responsibility. This for the present, leaves the requirements of interchange, standardization and development of practices out on a limb. Fortunately, the dissolved Electrical Section has left a heritage of valuable data. When the work of compiling more can be resumed, it will be done by those men, mechanical or electrical, who have survived the present and, we hope, temporary situation.

Why Not Mechanical?

Both the Coordinated Mechanical Associations' meetings and the Allied Railway Supply Association exhibits will be held in September.

While there had been no doubt about the associations' annual meetings, there was a question about the exhibits. These had been planned for the Coordinated Associations and the AAR Purchases and Stores Division during the same week in September. With the cancellation of the P&S meetings there was a possibility that the exhibits would be postponed. Now, as reported elsewhere in this issue, the exhibits will be held for the duration of the Coordinated meetings.

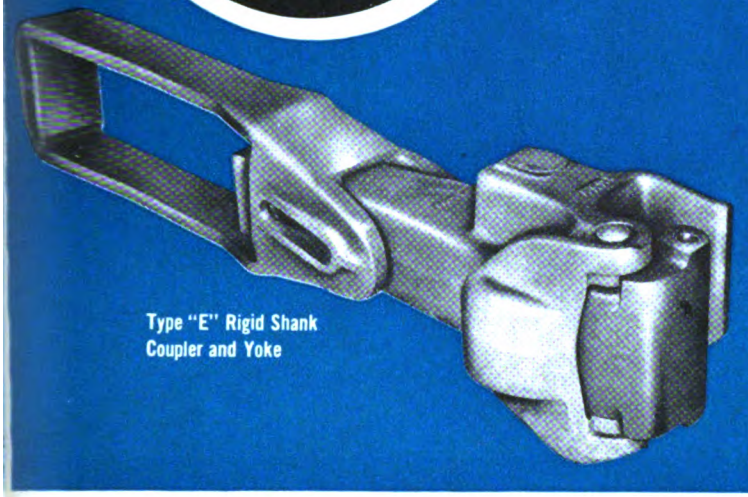
We believe the Coordinated Mechanical Associations meetings are both necessary and worthwhile. They serve a useful purpose. Yet we are disturbed about the cancellation of the AAR Mechanical Division's June meetings when we hear that meetings of other AAR Divisions will be held in 1961.

The decisions of no AAR division are more important than those of the Mechanical Division. Rules adopted by the membership of this division are mandatory for railway cars in interchange. These rules can, and frequently do, involve substantial financial committments.

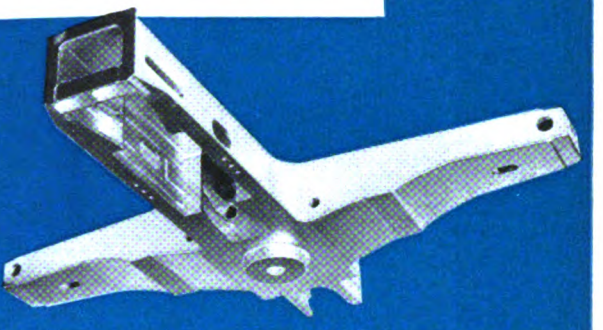
We are not questioning the economy measures of the AAR when it asked each division to forego its 1961 annual meeting unless there were "overriding considerations." But we believe that such economy should not be practiced by its most important division when other divisions find good reasons to meet.

We are happy that the Coordinated Associations will gather in September to discuss maintenance measures so essential to the railroads' economy. We are unhappy indeed about the Mechanical Division's meeting cancellation when it may be the only one to do so. Discrimination of this kind doesn't make sense.

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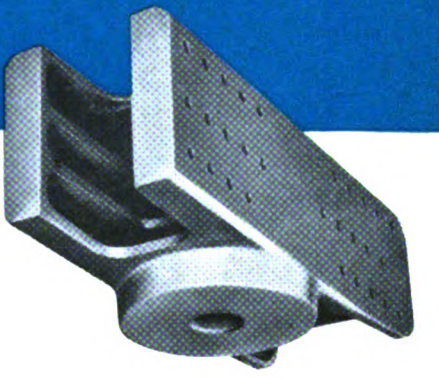


Type "E" Rigid Shank
Coupler and Yoke



One Piece
Underframe End

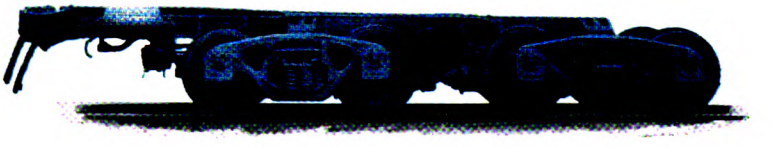
Buckeye Cast Steel COMPONENTS



Bolster Center Filler with
Integral Center Plate



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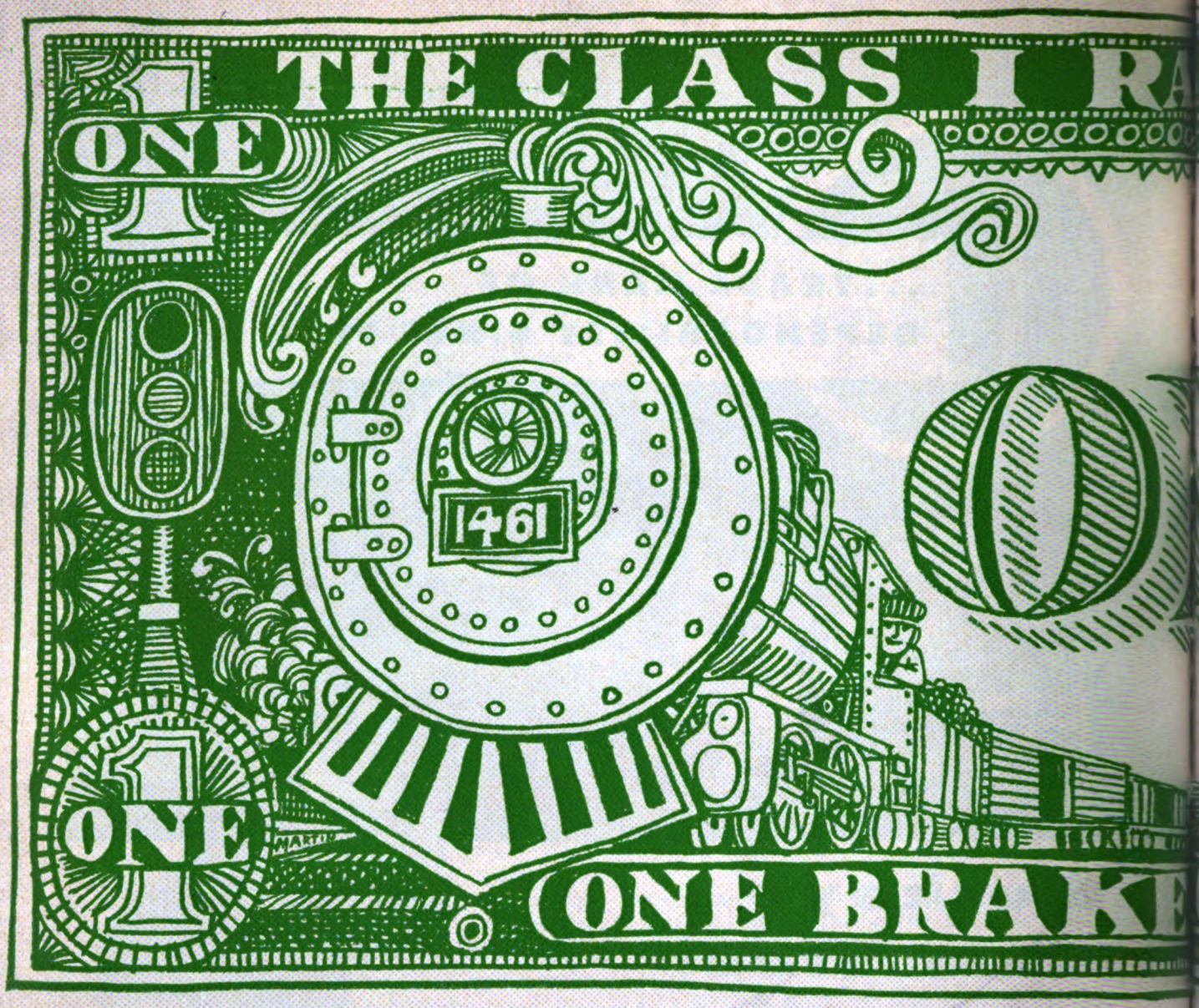
Heavy Duty Eight-Wheel Truck

Heavy Duty Six-Wheel Truck

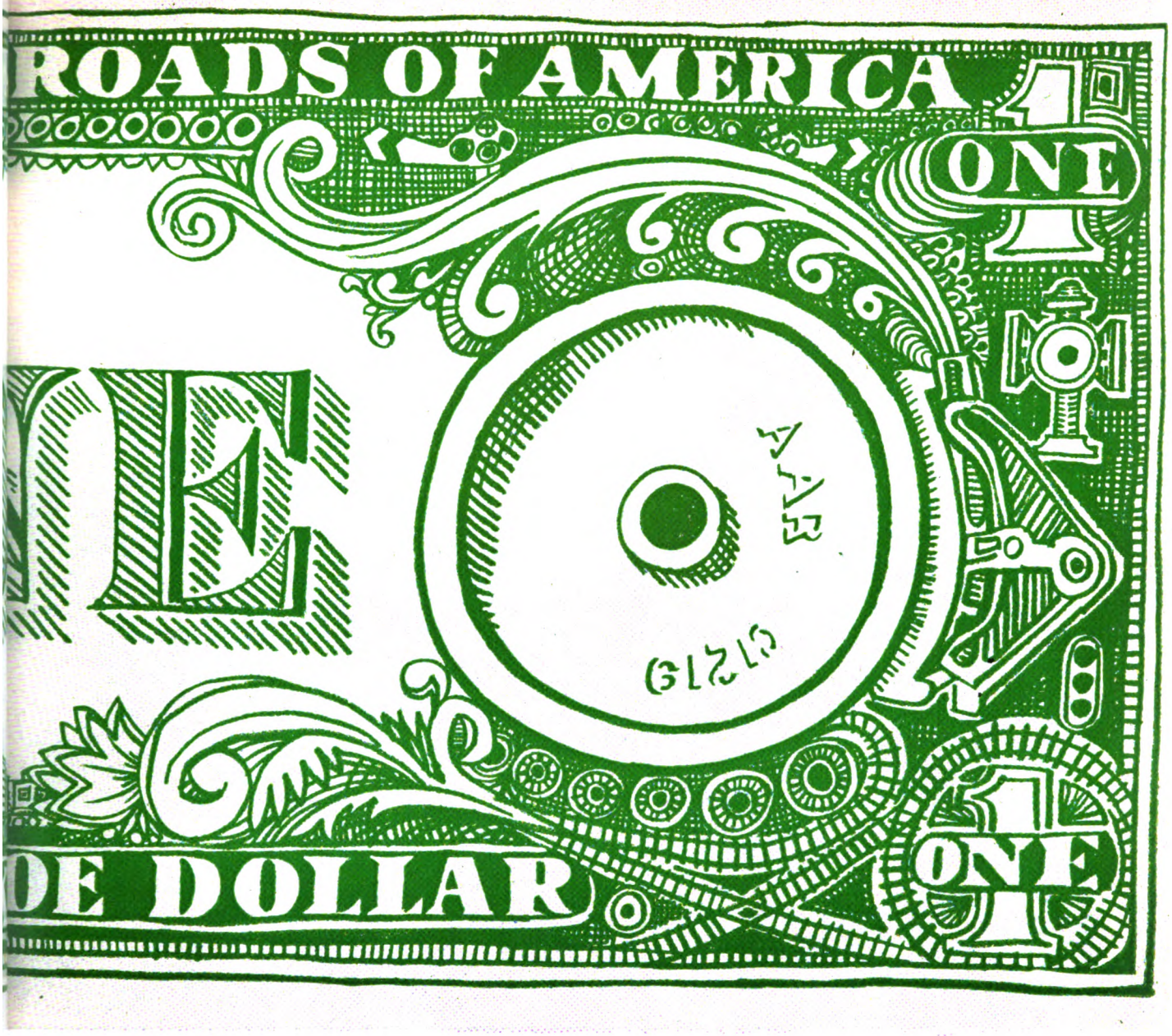


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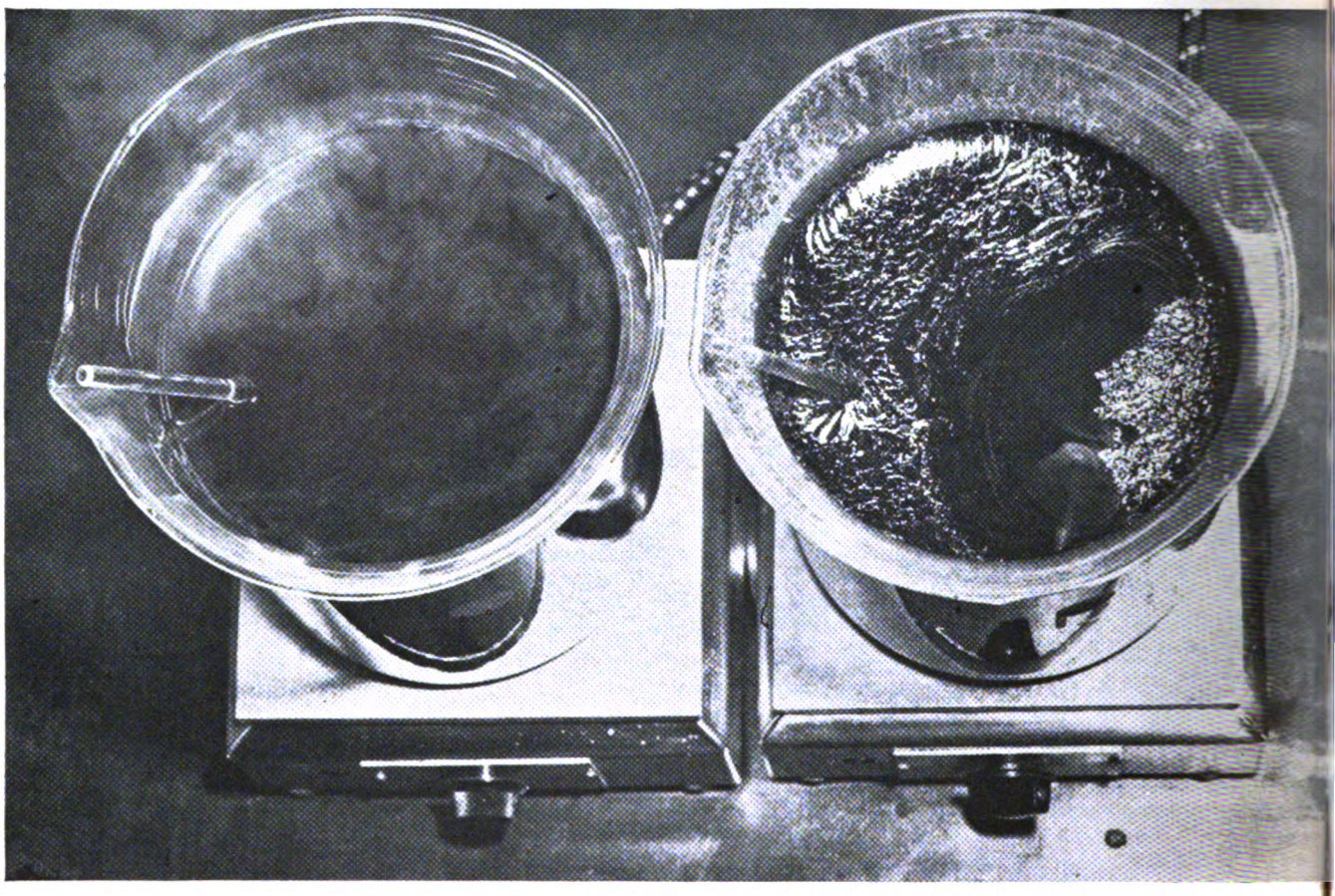
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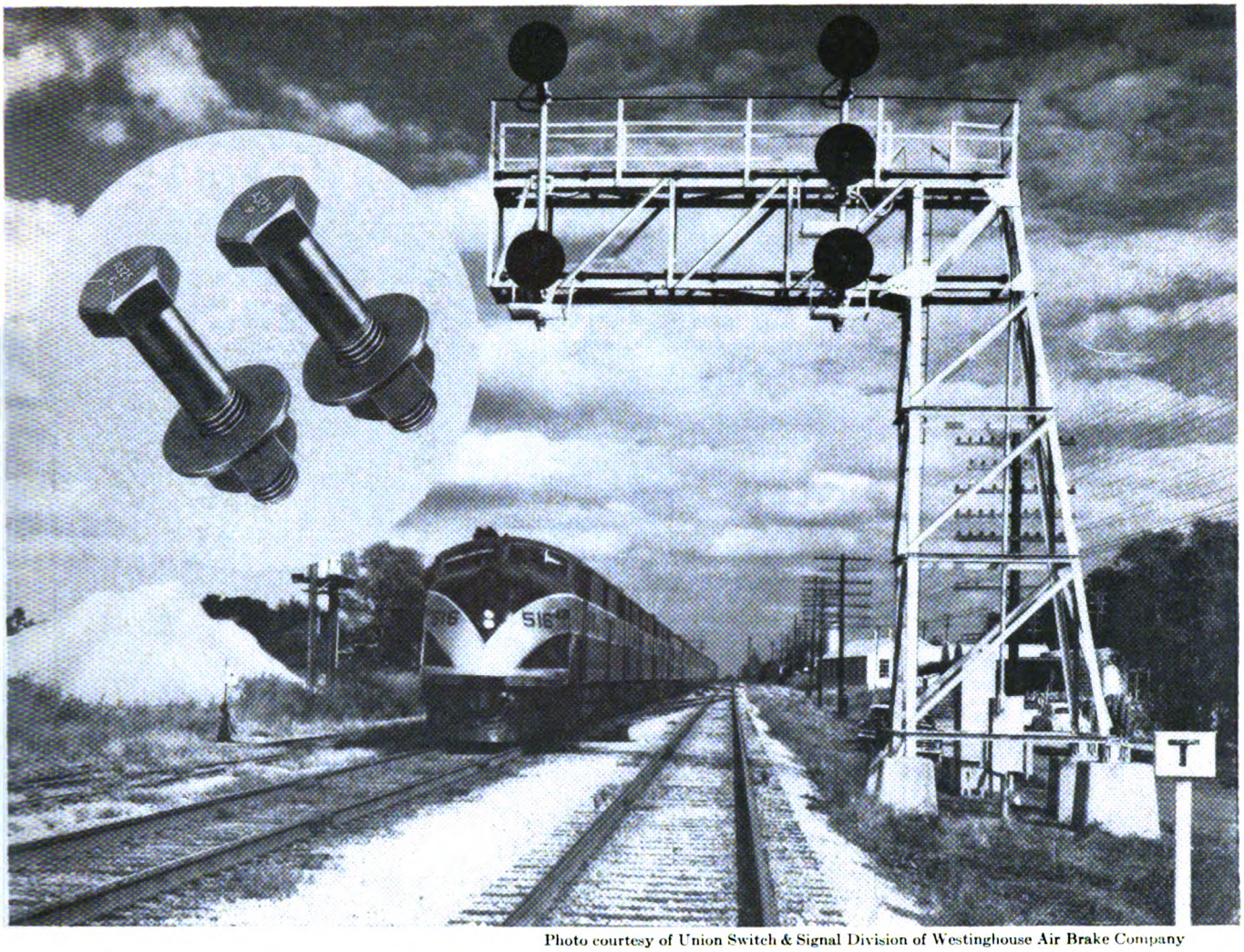


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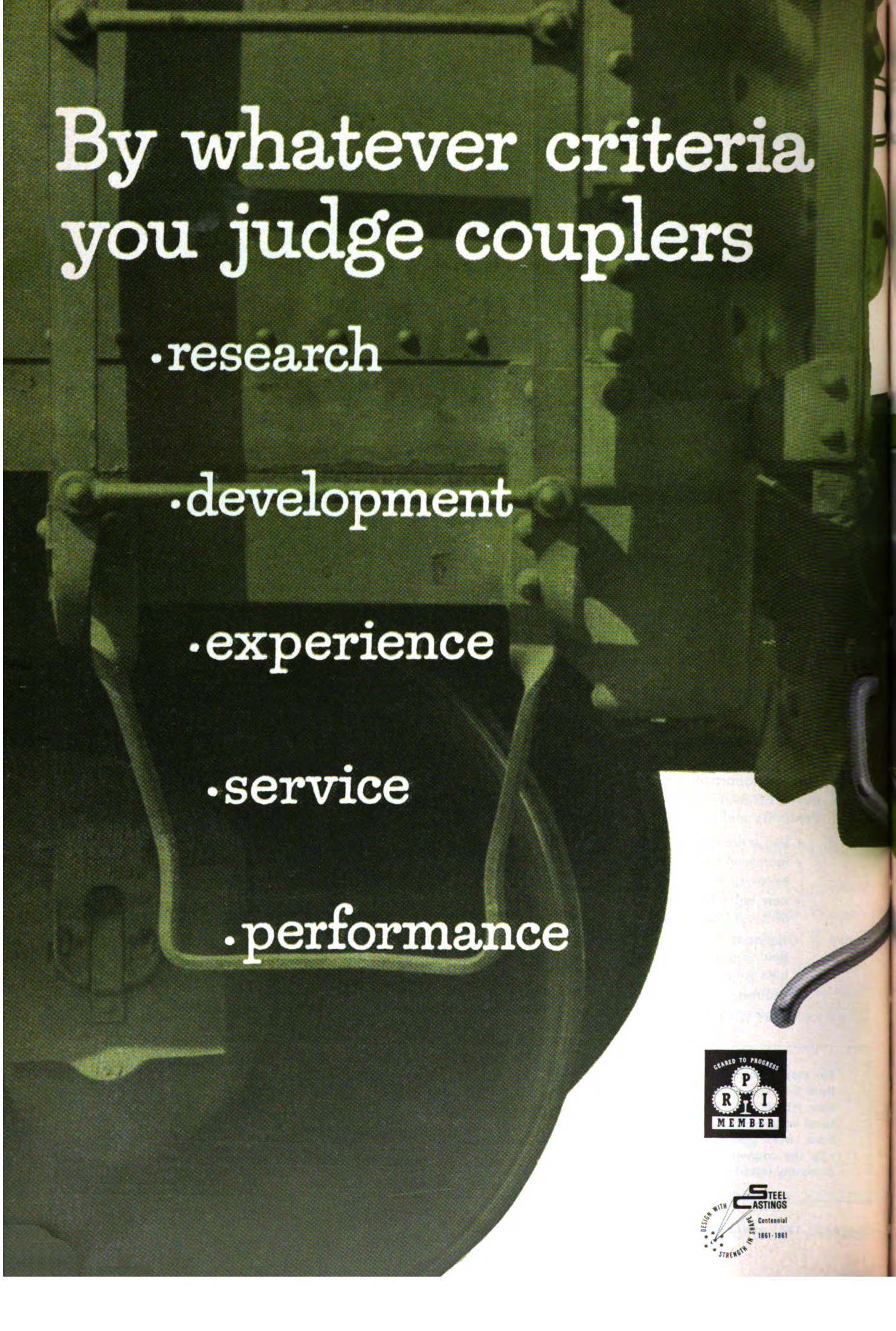
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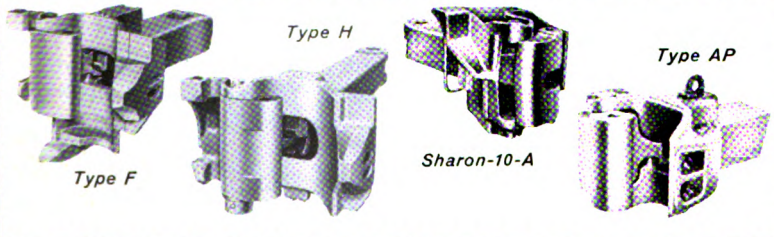
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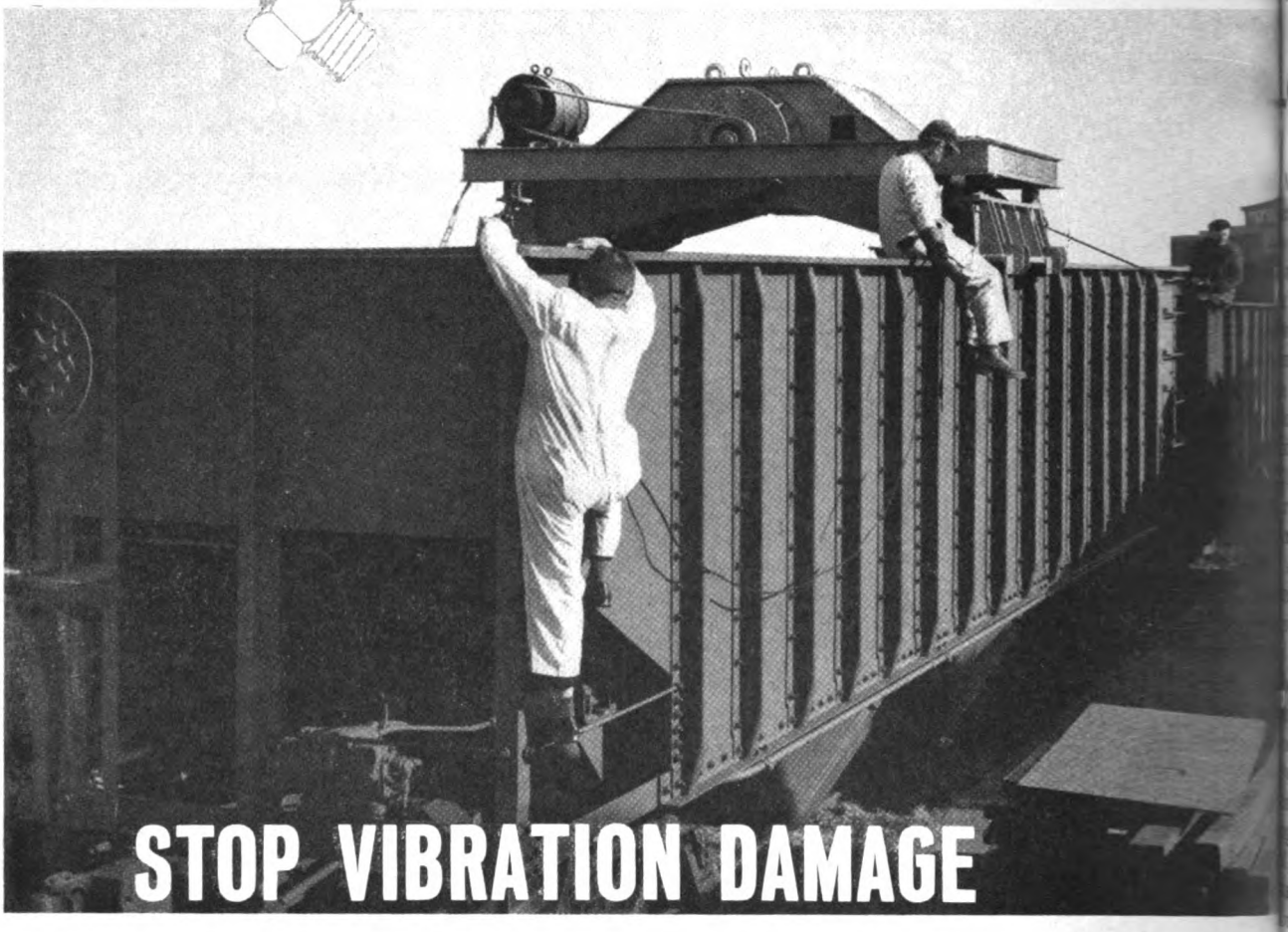
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- On another road, a similar 70-ton hopper car was rebuilt, with half the underframe riveted . . . and the other half bolted with RB&W High Strength Bolts. Impact and shakeout test results were fine. Inspection after six months of service showed many rivets loosened—but all bolts still secure.

There's proof that bolts are better than rivets to *start* with. They're even more advantageous at repair time. Dismantling damaged members and reassembling is simply a matter of removing bolts and re-installing them. Compare that with the time for burning out rivets, then re-riveting. And bolting can be done on any repair track instead of in the shop.

If you're interested in cutting costs, you should know more about fastening with RB&W High Strength Bolts. Send for Bulletin RR-3, see catalog 1c/RB&W in the Modern Railroads Catalog File, or ask an RB&W engineer to call. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.



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or Great Northern . . .

oop Conveyor Speeds AB Valve Repair

Mechanization of its facilities for rhauling AB freight brake valves been completed by the Great rthern. Valves for the entire system to be handled at the Jackson Street op at St. Paul, Minn. Currently, ne 90 to 100 emergency and serv- portions are cleaned, repaired, ed, and tested each day on a single t. GN officers expect an output of 000 to 14,000 overhauled valves year when the line is in full opera- n.

All steps in the overhaul are cen- ed around a pair of 105-ft belt- ven, live-roller conveyors, connect- by two 180-deg curved sections, o powered, which form a com- te loop. The conveyor moves clock- e continuously, completing one le in 17 min, traveling at 15 ft per n. There are 14 stations for clean- , repair, and assembly on one side the conveyor loop. Two ring repair tions and six AB test racks, three service and three for emergency rtions, are on the opposite side. o lapping machines are located t beyond the last of the 14 repair tions. If any group of stations is ed with work when a valve requir- that operation comes by, the valve ntinues around the main loop until e of the operators is ready for it.

erhaul Stations

Each repair and assembly station s a short gravity section, or pull-off elf, where a palletized part can be oved sideways from the conveyor hout lifting. Under each shelf is a rage space for pallets. The con- yor can be stopped by pushbutton any work station, and there is a ster control at the head of line.

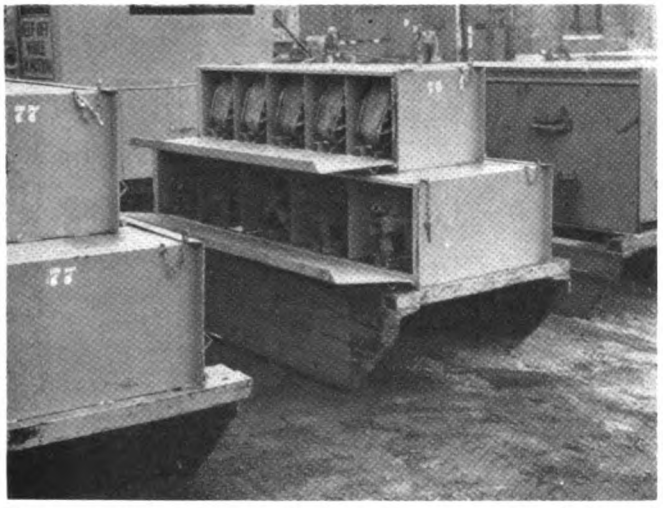
The line is operated by 25 carmen, cluding trainees. There are six test- k operators, twelve cleaners and semblers, two repairmen, one Lap- master operator, two ring repairmen, one shipper who cleans strainers and stencils and prepares valves for shipment, and one Wheelabrator attendant who also keeps the conveyor filled and repairs covers.

Shipment of valves to and from the shop is controlled by the Stores Department. Valves for cleaning and repair are handled in two-compartment steel containers. The upper section of this container holds ten emergency portions, and the lower section holds ten service portions. Upon delivery to the shop and prior to mechanical cleaning, the shipping covers on the valves are checked for tightness, and fitted sleeves are placed over the studs for protection. The valves, in groups of ten, are then placed with shipping covers down in a Wheelabrator abrasive type cleaning machine for a 5-min cleaning cycle. After cleaning, the shipping covers and strainers are removed and the individual valves loaded on 14-in. square wooden pallets. These pallets are placed on a combination live and gravity roller conveyor which terminates in a live-roller section which feeds the valves into the main conveyor loop. An automatic stop at the discharge end of the feeding conveyor is actuated by an electric eye. This photo-electric cell is on the main loop just before the junction. It gives the right-of-way to valves already on the main loop and opens the stop to release valves to the loop when space is available.

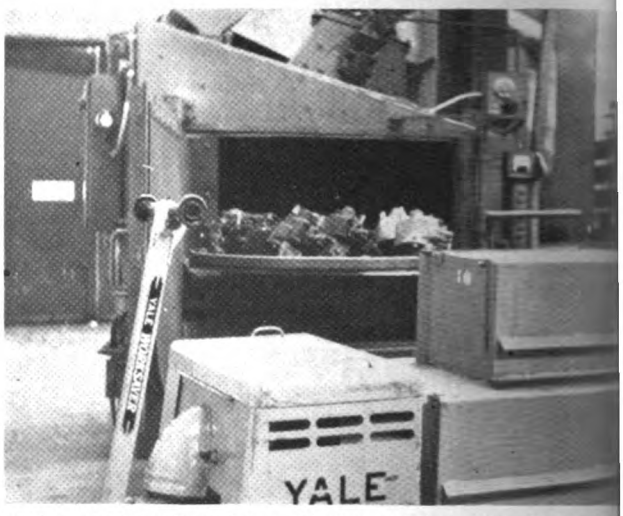
Valve position on the conveyor line indicates the work to be done. Valves removed from the Wheelabrator are set on edge to denote they are ready for disassembly and bench clean-



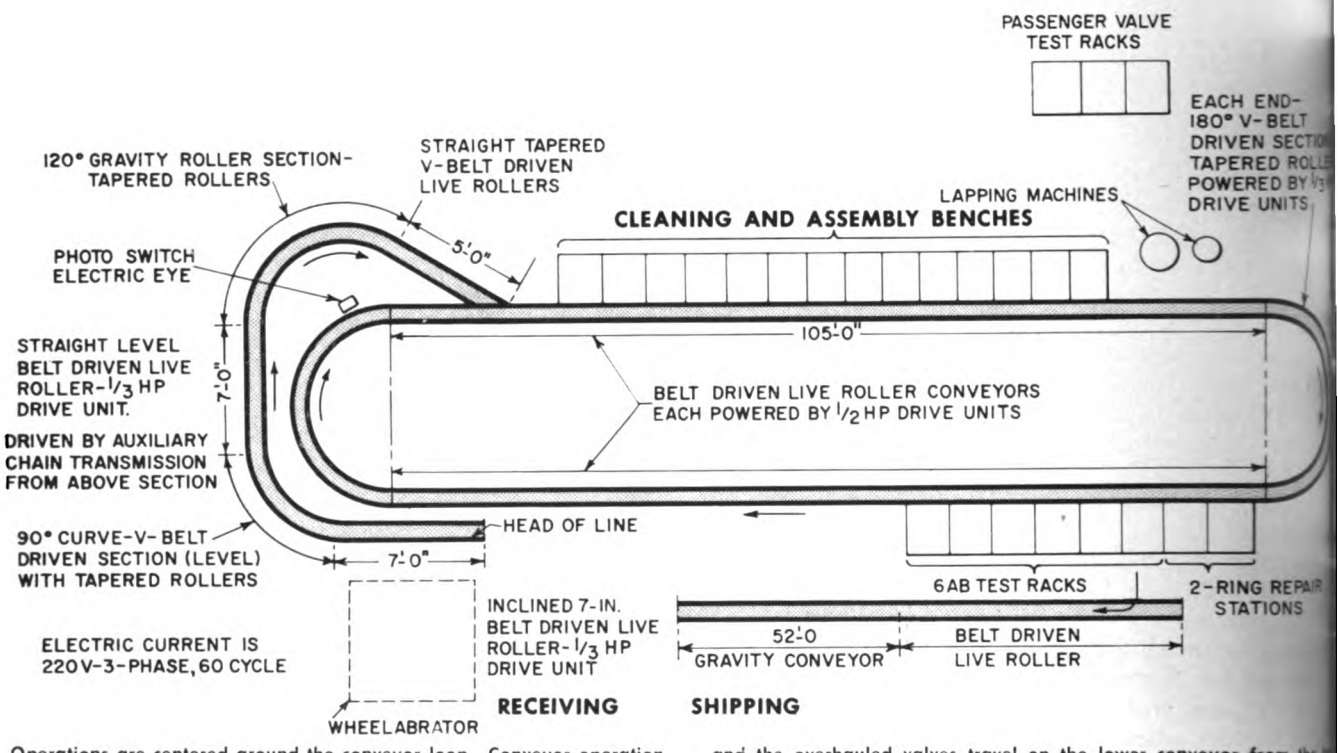
Brake valves continue to travel around conveyor loop until overhaul and test are completed. Dust collector is against far wall. Plans call for the shop to be fully air conditioned.



Shipping containers made at St. Cloud shop have individual compartments for holding 20 AB valve portions. Lift trucks handle them.



Portions can be unloaded from shipping containers directly into Wheelabrator machine for cleaning prior to going on conveyor loop.



Operations are centered around the conveyor loop. Conveyor operation can be controlled from central panel and from stations along the lines. Incoming valves are delivered to the Wheelabrator cleaner at bottom and the overhauled valves travel on the lower conveyor from the racks to the shipping position. Shop has been arranged to handle the GN's brake-valve requirements.

ing. After cleaning and assembly, valves are laid bushings down to keep the interiors clean and to indicate they are ready for test. Tested valves which have been rejected because of defective slide or graduating valves or rings are chalk-marked *S*, *G*, or *R*, or a combination of these, and are returned to the line, again placed on edge. Valves marked *S* or *G* are removed at the lapping operation. New parts are applied when necessary. Valves marked to indicate ring work move to either of the ring repair stations. After repair and reassembly, the valves are again placed bushing down and returned to the test racks for checking in compliance with the AAR test code.

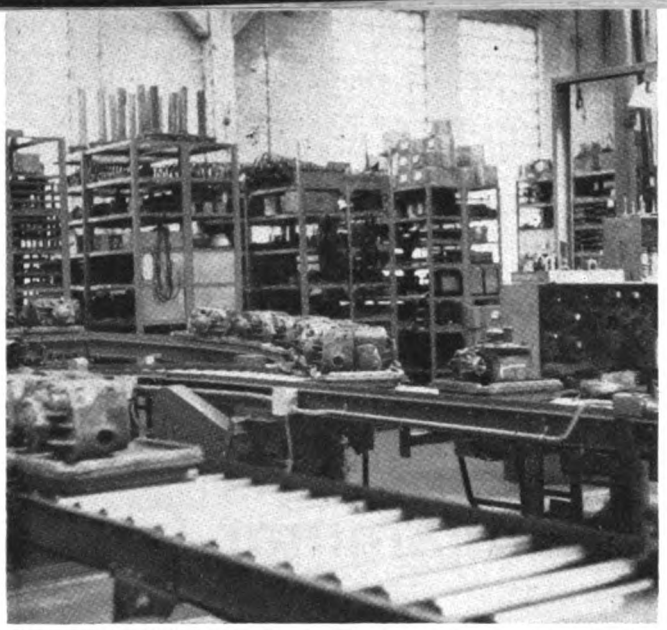
Valves passing the rack test are placed on individual pallets which move on a combination live and gravity roller conveyor to the shipping bench. The shipping cover, protector for release valves, and new or cleaned strainers for the pipe bracket are applied. The date is stencilled on the valve before it is returned to the shipping containers.

Each cleaning and assembly bench station has a stock of new or repaired parts provided by the Stores Department. Equipment includes an individual fluorescent light over the bench, impact wrenches, and an exhaust cleaning booth equipped with a separate light. Shop air is supplied at 110 psi. A combination of solvent and air is used with the cleaning gun. Each exhaust duct removes air and fumes at an 800-cfm rate and is operated with a foot pedal. Each AB test rack is equipped with a mechanical manometer instead of the conventional liquid type for testing release insuring

(*Continued on page 20*)



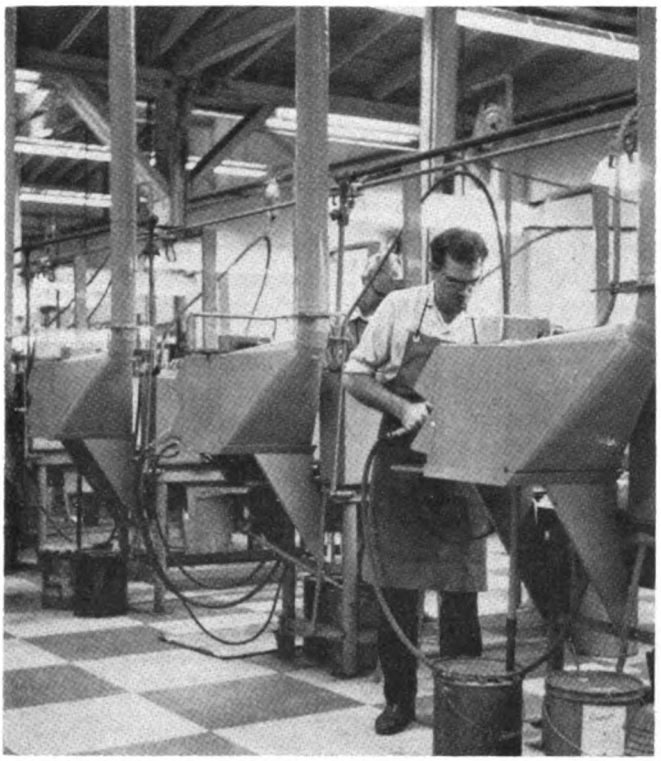
ılves removed from Wheelabrator are prepared for conveyor. They ove on the wooden pallets which are stacked underneath bench.



Photoelectric cell (left center) on main conveyor loop controls feeding conveyor stop and regulates delivery of portions on main loop.



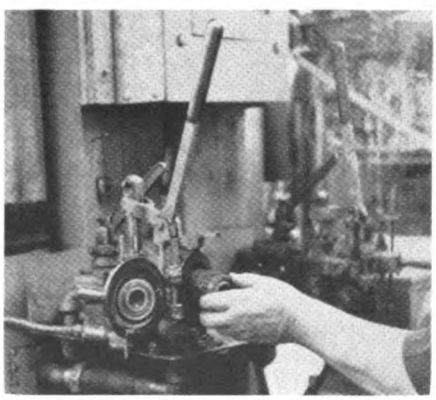
ılves on main conveyor loop are turned face down on pallets when ey are ready for test. Those on edge are to be taken off at one of e cleaning and repair stations for overhauling.



Each of 14 overhaul stations has hood connected to the overhead exhaust system. Bench is stocked with repair parts and with spray nozzles supplying compressed air and solvent.



lves which pass AB test racks (right) are ved on separate conveyor to shipping area.



Air strainers are cleaned in a special device which has been installed for the operation.



Protector is applied to the release valve as part of the preparation for shipment.

valves in service portions; a Flowrator is used at each bench for ring leakage tests. While service and emergency portions can be run concurrently on the loop, present practice is to process lots of about 100 of a single type to simplify lapping operations.

Overhead fluorescent lights provide 40 foot-candles at the repair stations. With the individual bench lights giving an additional 10 foot-candles, shadows in work areas are eliminated. Air conditioning is to be installed this year. There will then be a complete change of filtered air each 15 min.

Three test racks in a separate line are available for testing passenger valves, which are individually repaired. When needed, one Lapmaster is assigned for lapping the internal portions and the slides for these valves. During winter, when demand may be great, repaired passenger valves are stored in racks along one side of the cleaning room and are shipped on a unit exchange basis. Passenger valves with unserviceable bushings are dismantled. Bodies are sent to Dale Street shop, St. Paul, Minn., for new or rebored bushings. Currently, AB valves with unserviceable bushings are sent to New York Air Brake Company for repairs.

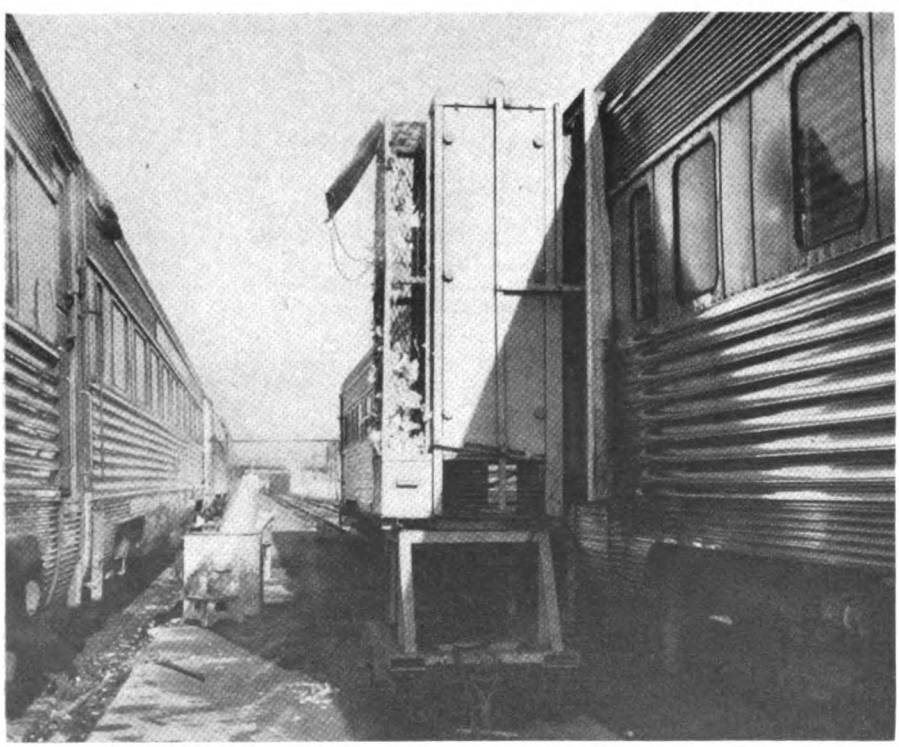
Windjammer Cleans AT&SF Coaches

High velocity air cleaners are now cleaning coaches and diesel locomotives on the Santa Fe. Three of the units are in use at the Chicago coach yard and five each in the locomotive shops at Argentine, Kan., and Barstow, Cal. First of these devices was put into use in September 1960. They have since proved so successful that their use has expanded rapidly.

The device, known as the Windjammer, was developed jointly by the Santa Fe and the Farr Co. Each unit contains two 24-in. fans which operate at 1,850 rpm and pull 33,000 cfm from the car or locomotive undergoing cleaning. Fans are powered by two 5-hp motors.

At the 21st Street coach yard in Chicago two of the devices are designed for cleaning conventional cars and one for the Sante Fe's Hi-Level El Capitan coaches. Coaches are normally cleaned in pairs by placing the cleaner against a vestibule side door between the two, with all the end doors blocked open. Head rest covers and heavy refuse are removed by hand. A cleaner with an 80-psi air line then works toward the fan ends of the cars, dislodging all refuse into the air stream induced by the high-capacity fan. Seats, carpets, radiators, and luggage racks are all blown to lift dirt and dust. Normal trip cleaning takes 10 to 15 min. per car. Extremely dirty cars are given a 1-hr cleaning by two men. Carpets are cleaned so effectively that they are now removed for washing annually, instead of quarterly, and air-conditioning ducts and coils can be cleaned annually also.

At locomotive shops the conventional blowing of generators, motors and high-voltage cabinets has been replaced by a system which uses one of the Windjammers against a carbody door. The former system only served to move the dirt from one place to another, not to remove it. Now one man loosens this dirt and the suction device draws it outside. The cleaner also has proved effective in removing solvent fumes produced while cleaning the interiors of locomotive carbodies. Cleaning formerly could not be continuous because of fume concentration.



Mobile suction device pulls air through cars, entrapping air-borne dirt and trash in high-velocity stream. Trash gathers in rear of unit, from where it is subsequently removed.



Blowing of all interior surfaces and fabrics car lifts dirt so it will be drawn out.

For Diesel Locomotive Applications . . .

Hydraulic Drives Have High Capacity

By Fritz Kugel

Hydraulic transmissions have been pplied to diesel locomotives with inreasingly higher horsepower ratings uring the past few years. Present chnology offers either the electrical r hydro-dynamic transmission for uch high-power applications. Attiudes about the horsepower limits of ese two types of transmissions have ometimes been based on the ratings f the majority of locomotives already n service. Because of the rapid deelopment of higher power hydraulic ansmissions, this may lead to unealistic conclusions.

Over the past ten years diesel-ydraulic locomotives with ratings of ,000 to 3,000 hp have been successlly operated on the German Federal ailroad, the British Railways, and thers. Two U.S. lines—the Denver Rio Grande Western and the Southrn Pacific—have ordered a total of x 4,000-hp units, each equipped with vo 2,000-hp Voith turbo transmisons (RL&C, March 1960, p 24; une 1960, p 35).

The 2,000-hp hydro-dynamic transission is the latest and largest deeloped by J. M. Voith of West Gerany for railroad service. More than ,850 Voith transmissions—with an ggregate of 3,100,000 hp — have een supplied, or are on order, for use n locomotives and rail cars. They are ll based on the same principles as he 2,000-hp units, although being ower powered.

With all power transmissions, the ze — consequently, the weight and ost — increases with the horsepower ating and expected life. In the course f increasing the rating, not only the rength and wearing qualities must be etained, but the function and effiiency of the original design should ot be changed. This can mean that he mechanical and thermal stresses ust be pushed to their limits without adverse effects on performance.

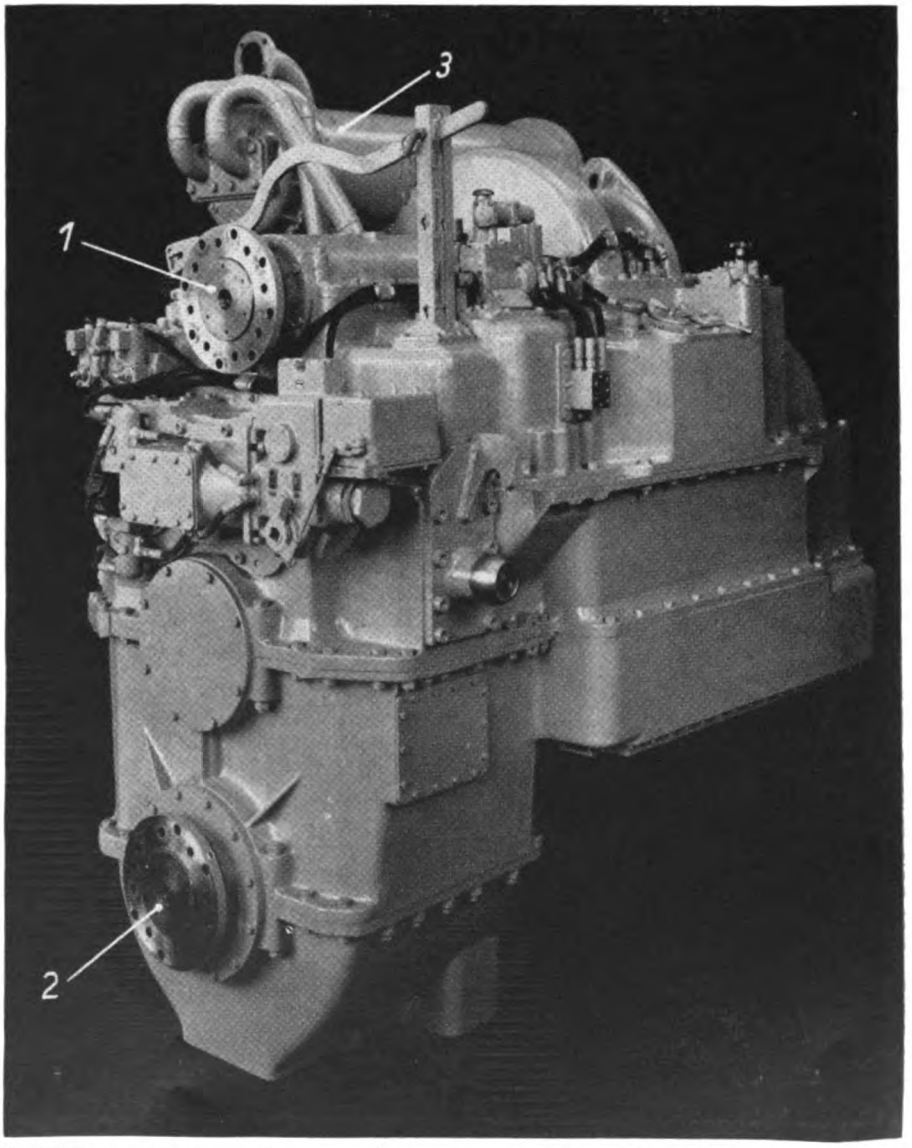
Necessary increases in dimensions and weights, when a power transmission design is enlarged to make it capable of handling higher input, can be calculated. Mechanical stresses in a hydro-dynamic transmission remain unchanged when a proved design of a given capacity and dimensions is enlarged to handle a higher input if the horsepower to be transmitted and the dimensions of the drive are related by the following formula:

$$N = \text{Constant} \times D^2$$

N is the horsepower, D is the reference diameter of any vital part of the transmission. All dimensions must remain geometrically similar when a given size of transmission is enlarged. The above formula assumes that the absolute peripheral speeds of the revolving parts are constant.

If hydro-dynamic transmission dimensions are increased according to formula, thermal stresses remain unchanged. The losses, which are manifested as heat, are proportional to output and can be dissipated under the same temperature conditions, because there will be a proportional increase in the volume of circulating oil.

If it is assumed that peripheral speed and the horsepower per square



Voith turbo transmission receives power from engine through input flange (1) and is coupled to trucks by output flange (2). Heat exchanger (3) is mounted atop the transmission housing.

Mr. Kugel, VDI, is director, transmission division, J. M. Voith, GmbH, Heidenheim, West Germany. Voith is a designer and builder of hydraulic transmissions for railroad applications.

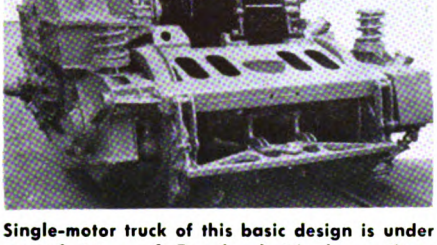
inch of rotor surface are constant in an electric power transmission, the relationship between horsepower and dimensions would be the same as for the hydraulic transmission. It will be found that the mechanical stress relations are very similar to those in hydraulic power transmissions. This is not the case when thermal stresses are considered.

When a given electric machine is geometrically enlarged, the external surfaces will increase in direct proportion to the heat losses. However, paths for the transmission of the heat to these external surfaces will be lengthened at the same rate. A higher temperature differential would be required to force the same quantity of heat per square inch of surface through this longer path. If external surface temperature is to be maintained, temperatures inside the machine—in the windings, for instance—must be higher. If the heat cannot be dissipated as readily when horsepower input increases, dimensions must be increased more than would be indicated by the above relationship.

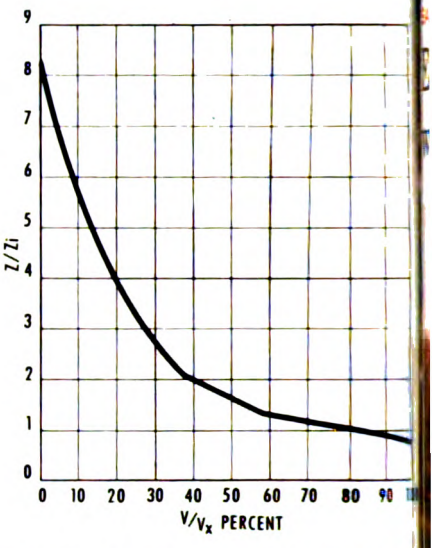
Thermal conditions do constitute a serious "bottleneck" for electric transmissions. Heat losses of the electric transmission must be dissipated from the insulated and embedded windings by volumes of cooling air delivered by the traction-motor blowers. Because more heat is developed during starting and at low speeds, short-time current limitations are frequently imposed.

Transmission oil, the working fluid, removes the heat generated by losses in hydraulic transmissions. The high specific heat of this oil makes it effective both as a heat carrier and heat accumulator. In the transmission heat exchanger, this oil is cooled by the diesel-engine cooling-water system. Maximum ratings of hydro-dynamic transmissions can be at least equivalent to those of their electric counterparts.

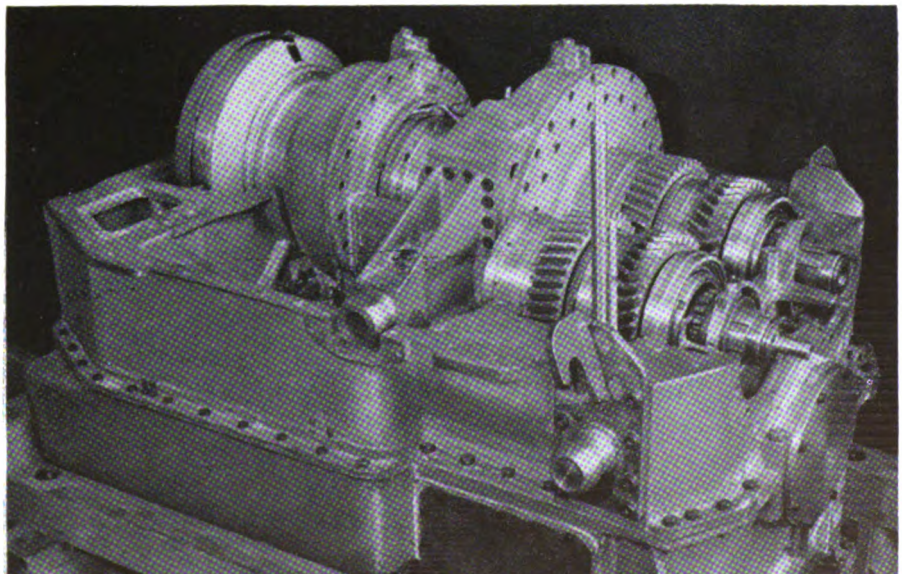
Space and weight limitations can have an important bearing on the design of transmission for diesel locomotives. Because the generator and motors of the electric transmission are separated, this transmission is inherently heavier than a comparable hydraulic transmission. If the total weight of the locomotive exceeds the adhesion weight required for a traction job, excess weight can detract from overall efficiency. This can be particularly important when grades are to be negotiated.



Single-motor truck of this basic design is under several types of French electric locomotives. Gearing one motor to both axles is said to improve adhesion characteristics.



Speed and tractive-effort curve for three-converter turbo transmission shows that range changes can be accomplished smoothly. Tractive effort is represented by Z/Zi; speed by V/Vx. Tractive effort (kg) is calculated from formula Z = (Z/Zi) × Zi, in which Zi = (N × Vx) / 270. N is metric horsepower, Vx maximum speed in km/hr.



Voith transmission with top portion removed shows the mounting of gearing and converters on shaft. Moving parts are immersed in oil, resulting in low wear, according to the author. Gearing operated at standstill produces dual-service locomotive.

Axle Drives

Even when it is admitted that the hydraulic transmission is practical, doubts are frequently expressed about the transmission of power to the locomotive axles.

Both mechanical and hydraulic transmissions do require a mechanical linkage with the driving axles. This, it is sometimes claimed, can be a source of difficulties. Although it may be conceded that jack-shafts and side rods on low-speed, rigid-frame locomotives work satisfactorily, there is doubt about the gears and cardan shafts used on high-power, high-speed locomotives.

Rigid coupling of several axles was not considered objectionable on steam locomotives. Connecting the axles of an electric-motor-driven truck has, at times, been regarded as advantageous. This can make possible the use of a single traction motor geared to both axles, with resultant weight savings.

(Continued on page 30)

SAFE WITH SERVOSAFE®

Experience counts when you're talking about hot box detection



Railroad Products Division Chief Technical Advisor William Pelino (left) discusses details of the SERVOSAFE® Hot Box Detective system at trackside with Frank R. Woolford, Chief Engineer of the Western Pacific. Electronic engineer Pelino has removed the housing to show how infrared scanner employs patented "slant-aspect viewing" method to focus on optimum trailing edge of passing journal box.

No one understands real experience better than a railroadman. It's the incomparable knowledge, skill, technique, and judgment that comes only through being actively engaged in a particular kind of work for an extended length of time.

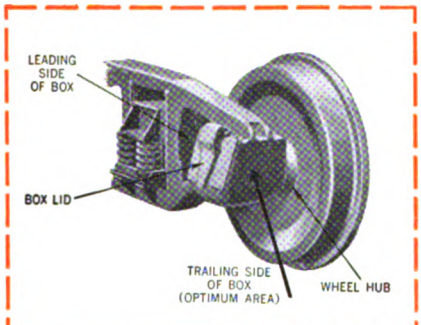
In evaluating modern hot box detection systems, railroad veterans naturally have high regard for Servo Corporation of America. Understandably so. Pioneers early in 1952 of the SERVOSAFE® Hot Box Detective* system, Servo's Railroad Products Division can speak with the authority of experience.

Substantiating this confidence is the experience of 28 major Class I railroads on which several hundred patented Detective systems have amassed approximately *3 million hours* of successful operation over the past 4 years. What finer tribute and testimonial!

"There's no substitute for experience," it has been said with wisdom. This maxim holds especially true when you're talking about something as important as the *hot box*, and the best way to *detect* it.

Naturally, any railroad signaling and communications system such as the Hot Box Detective requires unusual knowledge, skill, and judgment in its application. With eight years of application engineering behind them, right at trackside, Servo railroad electronic specialists can make expert recommendations as to which of the *six* successfully operating SERVOSAFE systems should be installed at particular sites on particular roads. They can suggest best locations for scanners, recorders, hot box locators, and automatic alarms to provide peak efficiency and greatest operating flexibility and convenience.

Be safe with SERVOSAFE. Just give your experienced Servo man a call.



TRAILING EDGE SHOWS HOT BOX BEST

Tests conducted by a major Eastern railroad prove that the trailing edge of the journal box presents the optimum accessible area for hot box inspection. Presenting a low-mass path of thermal flux from the bearing, this spot responds most rapidly to bearing temperature changes. The SERVOSAFE® "slant-aspect viewing" method of scanning this optimum area is protected by Servo patents both in the U.S. and abroad. Hot boxes—as well as developing hot boxes—can best be detected the SERVOSAFE way.

**Protected under one or more of the following U.S. Patent Nos.: 2,880,309, 2,947,857 and 2,963,575. Other U.S. and foreign patents pending.*

SERVO CORPORATION OF AMERICA

111 New South Road • Hicksville, L. I., N. Y. • WEIls 8-9700

Railroad Products Division | SERVOSAFE® HOT BOX DETECTIVE* SYSTEMS
RAILROAD RADIO COMMUNICATIONS SYSTEMS

Electronic specialists to the nation's railroads • Sales and service centers coast to coast

FOOTNOTE FACTS:

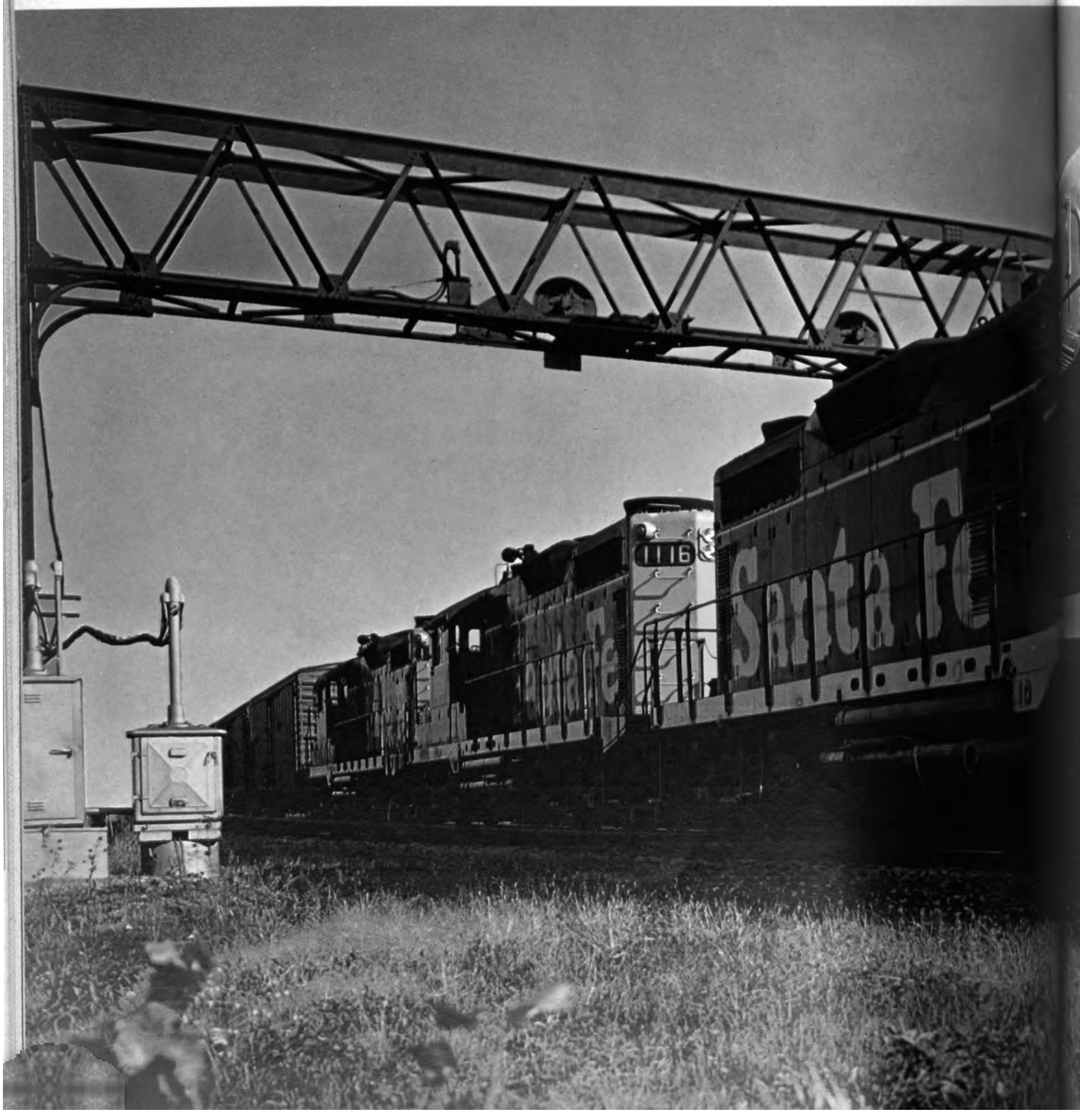
Efficiency— SERVOSAFE roads report better than 90 per cent efficiency...in some cases as high as 100 per cent for consecutive periods over six months.

Savings— One road reports savings of over $100,000 per installation per year, allowing amortization of the equipment in approximately one month.

New patent— Patent No. 2,963,575 covering automatic alarm hot box detection devices was issued to Servo Corporation of America on Dec. 6, 1960. Granting of this latest patent now protects with three patents various infrared detection systems pioneered and marketed by Servo Corp.

New 2000 hp GP-20's at work on the

SANTA FE



Twenty-five new 2000 horsepower GP-20's are at work on the Santa Fe, pulling the freights between Chicago and Kansas City . . . on overnight service . . . on broad range pool operations. Added capacity per unit enables three new GP-20's to replace four older locomotives.

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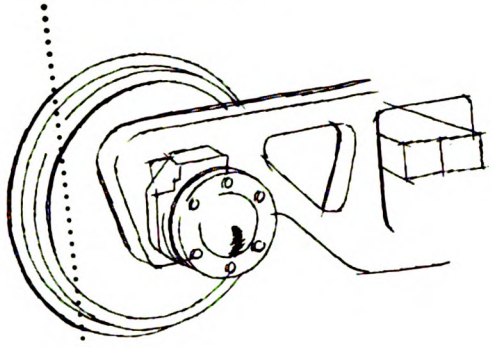
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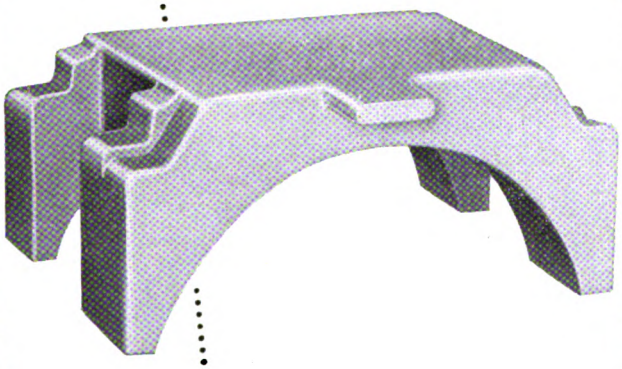
In Canada: General Motors Diesel, Limited, London, Ontario

GENERAL MOTORS LOCOMOTIVES



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NATIONAL ADAPTERS
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all freight car truck
roller bearings





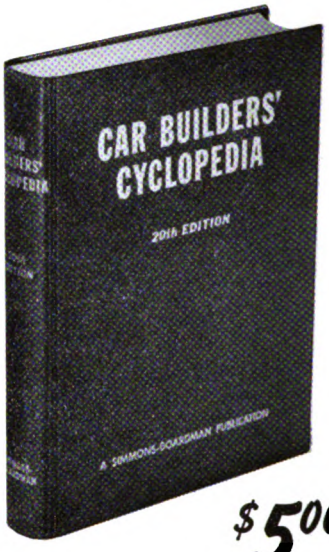
- AAR Standard Adapters—for AAR Alternate Standard Narrow Jaw Pedestal and Integral Journal Box Side Frame applications; for Cartridge Type Roller Bearings of All Manufacturers.
- Special Adapters for AAR Wide Jaw Pedestal Side Frames. A-2943A

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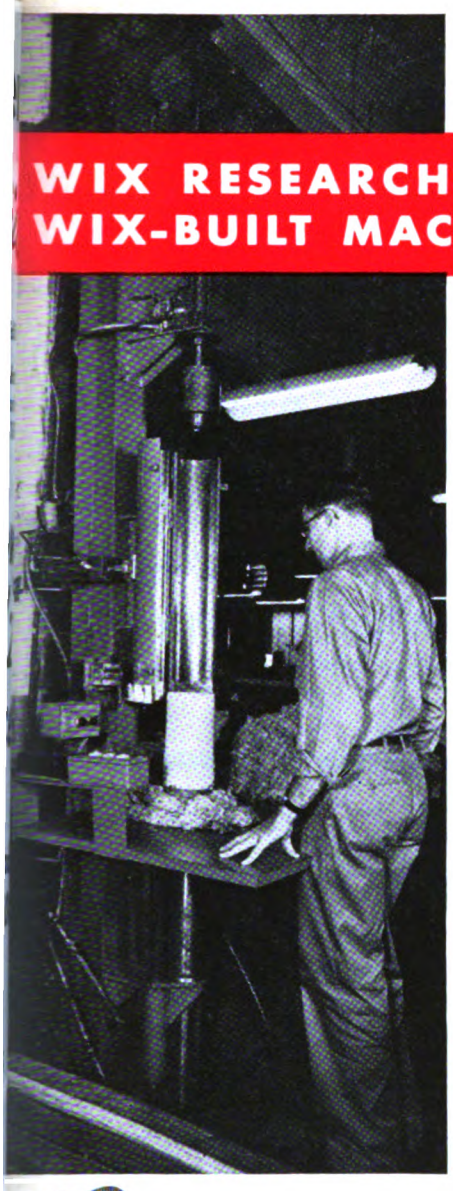
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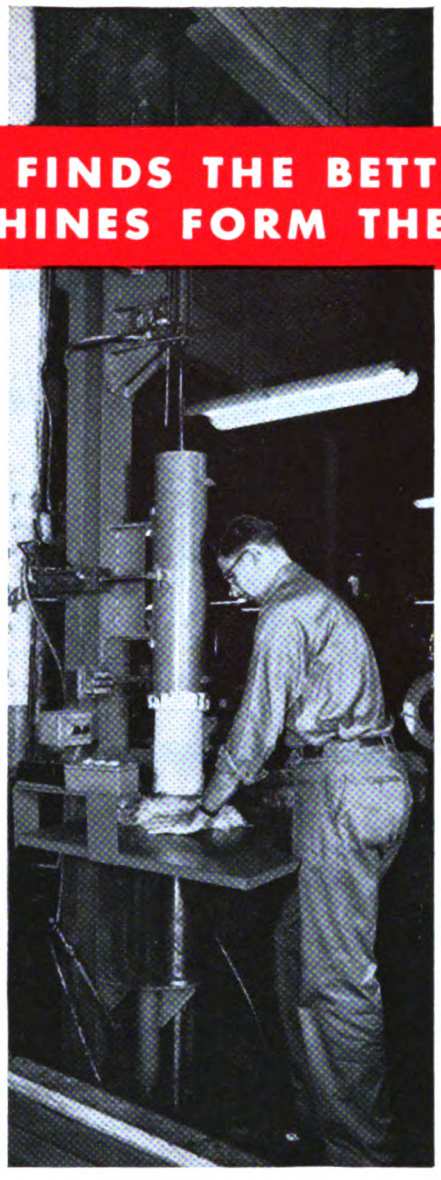
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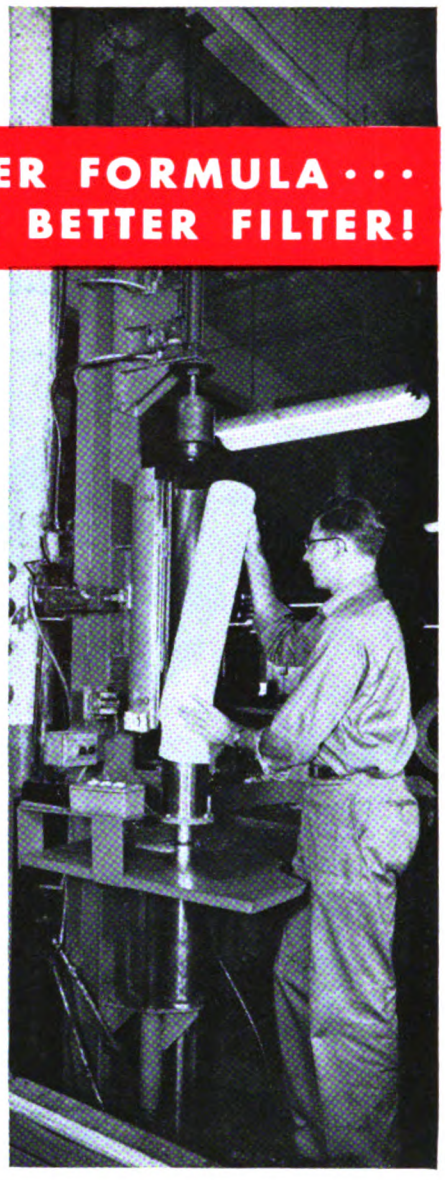
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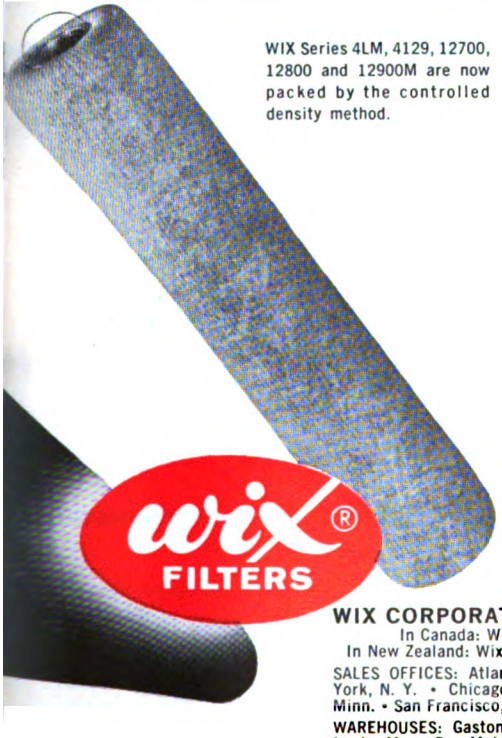
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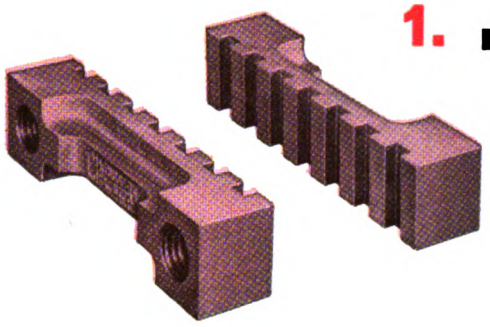
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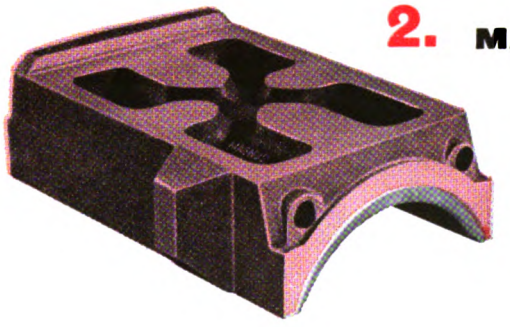
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Now MAGNUS offers you three low-cost ways to



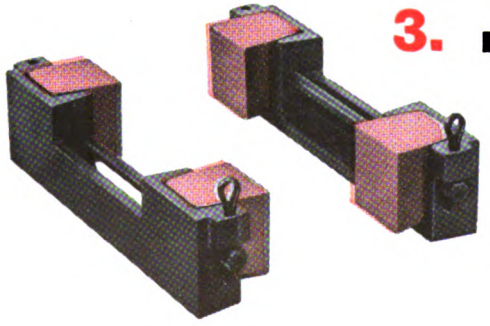
1. MAGNUS R-S JOURNAL STOPS

Provide maximum stabilization of the entire journal box assembly—increase miles per hot box ten times



2. MAGNUS FLAT-BACK SOLID BEARINGS

Wider, non-tilting design limits bearing displacement—provides effective stabilization at lower cost



3. MAGSTOPS

Offer the inherent advantages of R-S Journal Stops in a low-cost, rugged, fabricated design

THE NEXT big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

JOURNALS—

et BETTER BEARING PERFORMANCE

Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures —increase miles per hot box *ten times;* miles per cut journal, *fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.

Journal Stops give the low-cost solid bearing a chance to work at optimum efficiency, not just part of the time, but *all* of the time! They can be easily installed on any freight car, new or old. And they increase new car costs less than 2%—*pay for themselves* in less than 3 years!

Wear on R-S Journal Stops is slight, and Stops can be re-shimmed should wear become excessive. The Stops should last the life of the side frame.

The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust guard, tends to prevent spread linings in the bearings.

The flat-back bearing is also manufactured to "pre-war length," increasing resistance to impact and wear at both collar and fillet ends. Its greater mass and weight result in a more *rugged* bearing with inherently greater life expectancy.

Magnus flat-back bearings are interchangeable with any standard raised-back bearing, simply by using a flat-bottomed wedge. Bearing dimensions, in each size, are the maximum which can be easily installed in the journal box through the standard lid opening.

Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The big advantage of the MAGSTOP is low-cost installation that can be accomplished quickly whenever side frames are removed for any reason. The bronze inserts provide ample bearing area and can easily be replaced, if required, without shopping the car.

By limiting journal movement within the box, MAGSTOPS greatly increase bearing life, protect against dust-guard damage, prevent loss and contamination of lubricant. They reduce wheel flange wear, too.

MAGNUS METAL CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

GEARED TO PROGRESS R I MEMBER

Hydraulic Drives Have High Capacity

(*Continued from page 22*)

Adhesive weight can be used more efficiently and there is less possibility of wheel slip. This arrangement is used on the Type BB-9400 electric locomotives of the French National Railways (RL&C, May 1960, p 38). The General Motors GA-8 locomotive is an example of a low-horsepower diesel-electric locomotive which utilizes cardan shafts and axle drives to couple two axles with a single motor (RL&C, January 1959, p 18). This is an arrangement typical of that used with hydraulic transmissions.

The cardan shaft, originally developed for highway vehicles, must meet very exacting requirements when used for railway applications. These design problems have been solved. Many high-power, truck-type, diesel-hydraulic locomotives with cardan shaft drives have already been in operation for long periods, proving their dependability.

Voith Transmission

Because a single hydro-dynamic circuit—either a torque converter or a fluid coupling—cannot be effective over the entire speed range of the locomotive, several consecutive circuits must be provided for successively higher speed ranges. Usually, hydraulic circuits for three ranges will be satisfactory to give a high starting tractive effort and a useful maximum speed.

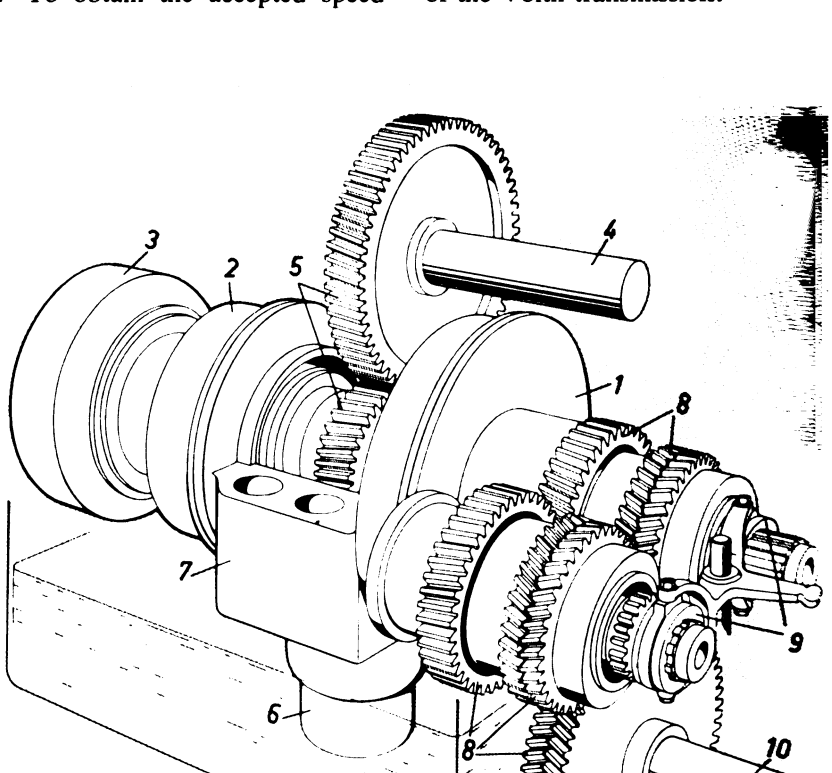
Another way to do this is to use a series of different gear ratios behind a single torque converter. With this arrangement, gears have to be changed while the locomotive is moving. The Voith transmission adjusts for the different speed ranges by filling and emptying the hydraulic circuits of the torque converters and hydraulic couplings. Each such circuit covers a well-defined speed range in which it operates at optimum efficiency.

The pump impellers are keyed on a single primary shaft which is usually driven from the diesel engine through a step-up gear. Step-up gears make possible smaller rotating parts and permit a given transmission to be used with engine of different horsepowers and speeds by changing the step-up gear ratio. Turbine runners of the different hydraulic circuits are connected to the output shaft through gear sets that are permanently in mesh. A small filling pump driven off the primary shaft and a piston-type distributing valve control filling and emptying to engage and disengage the hydraulic circuits of the transmission. trolled by track speed and engine output. During changeover, the filled oil circuit empties while the next is filling, so there is no interruption in tractive effort. There are no wearing parts, with the exception of the gears and bearings.

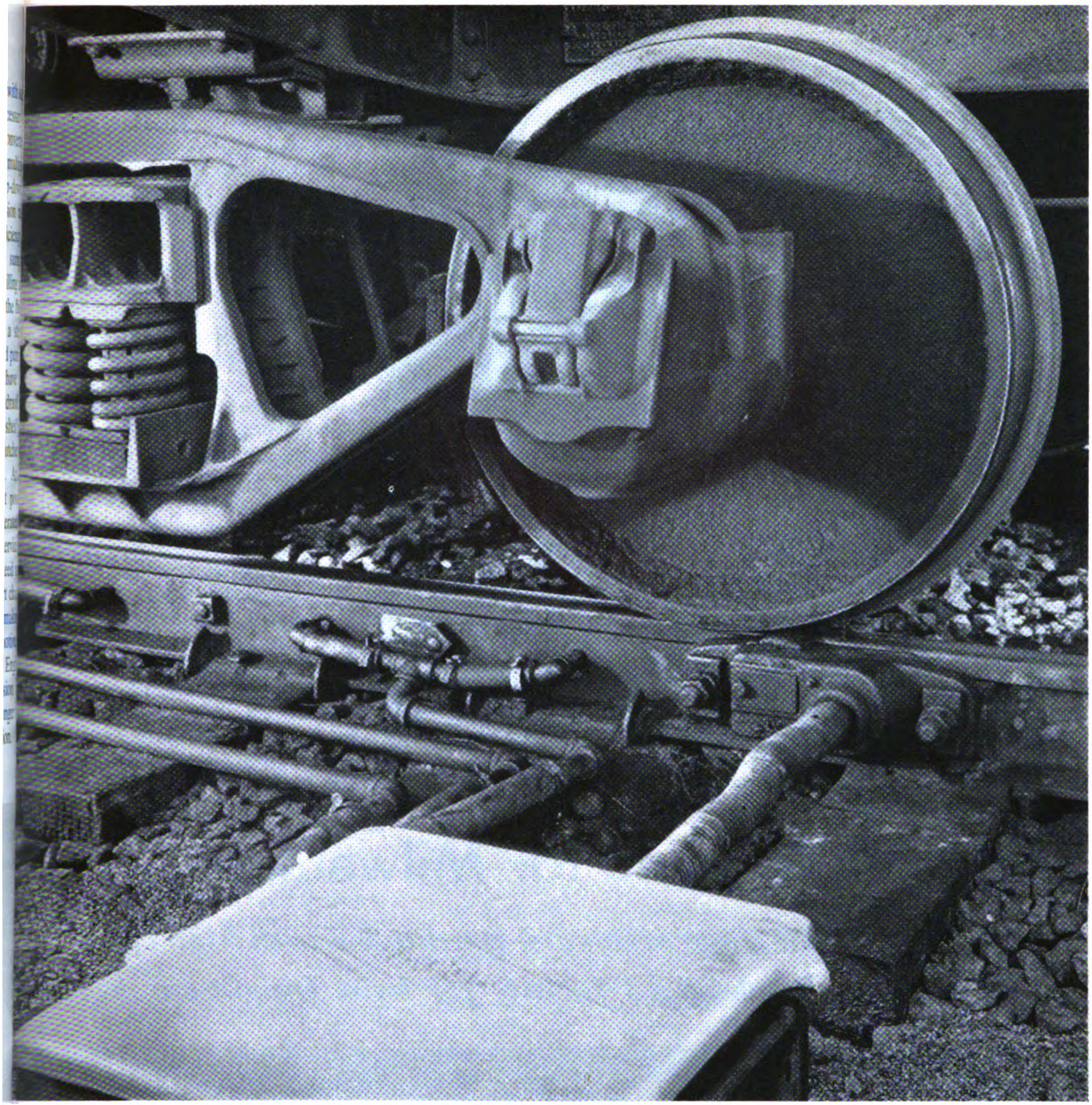
In the conventional Voith turbo transmission, hydraulic circuits are adapted to different speed ranges both by varying the individual turbine designs and by using the same turbines, but varying the gearing between them and the output shaft.

Space restrictions in a high-horsepower locomotive made it desirable to simplify and reduce the size of the high-power Voith transmission. The three hydraulic circuits have been adapted for the three different speed ranges only by varying turbine blading. To obtain the accepted speed-tractive effort curve with such a simpl fied rotor, it was necessary to deve a starting torque converter with e tremely high torque multiplication.

Elimination of step-down gears fro this Voith transmission means som improvement in efficiency. Witho these gears, the oil sump could b designed solely for filling and empt ing requirements of the fluid circuit are driven through a step-up gea The primary shaft and pump impeller These transmissions have two torqu converters and one hydraulic couplin Reversing is accomplished by five spu gears and two claw clutches which ar operated at standstill. An additiona set of gears makes it possible for a locomotive to be operated either i passenger or freight service by estab lishing two overall speed ranges wit optimum tractive effort characteristic in each. These gears, making possibl a dual-purpose locomotive, are al operated at standstill. Engine coolin water and transmission oil pas through the heat exchanger on the to of the Voith transmission.



Schematic diagram of the rotor of the Voith transmission, which includes three hydraulic circuits indicates following parts: (1, 2 and 3) hydraulic circuits; (4) input shaft; (5) step-up gear (6) filling pump; (7) piston distributing-valve; (8) reversing gear; (9) claw clutches for reversing gear; (10) input shaft.



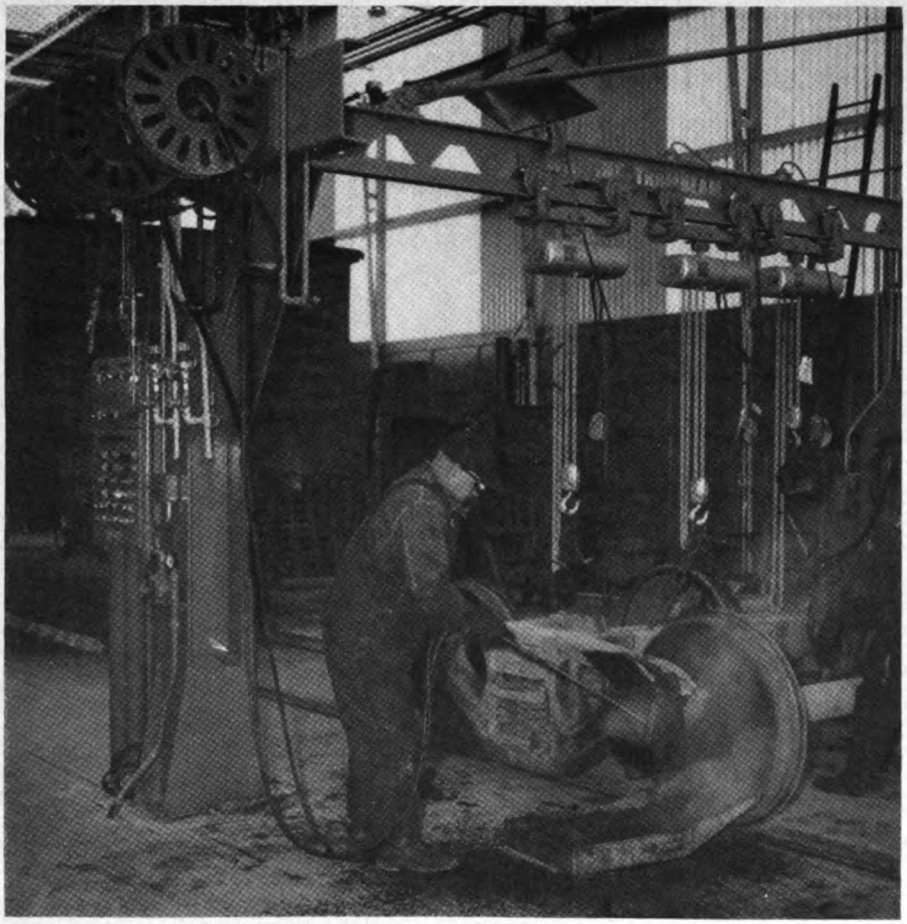
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ESSO STANDARD, DIVISION OF
HUMBLE OIL & REFINING COMPANY

Esso



Boxes are blown with mixture of Stanisol and air. When jib crane is across track or jacks are up, cars cannot be moved into working area. Car-moving controls are mounted on crane mast.

'Spot' Car Repairs for Milwaukee

Chicago area yard is equipped with high capacity, mechanized facility for light freight-car repairs

Reduced per diem costs and improved working conditions are two of the benefits resulting from the $1-million investment which the Milwaukee has made in a one-spot car-repair facility at Bensenville, Ill. The road chose its major Chicago area classification yard for this installation—the first one-spot facility it has built.

Production is now averaging 85 light repairs daily with round-the-clock operation. Delays to cars requiring light repair have been greatly reduced, providing better service for shippers. The 120- x 120-ft fabricated shop building houses four service tracks and is immediately south of the hump at the west end of the classification yard. An adjacent stub-end outdoor track serves as a location for handling wheels and for doing heavier repairs which might delay the production-line facilities.

Individual service tracks, designated A, B, C, and D from the north, are each equipped with two Whiting 40-ton, recessed, traversing jacks which can raise a car within 25 sec. Cars are spotted at the jacking locations by spring-operated, air-release retarders. Each track has a pair of Whiting Tram-beam jib cranes for truck repairs. Each crane has a 1-ton electric hoist for lifting bolsters and two ½-ton electric



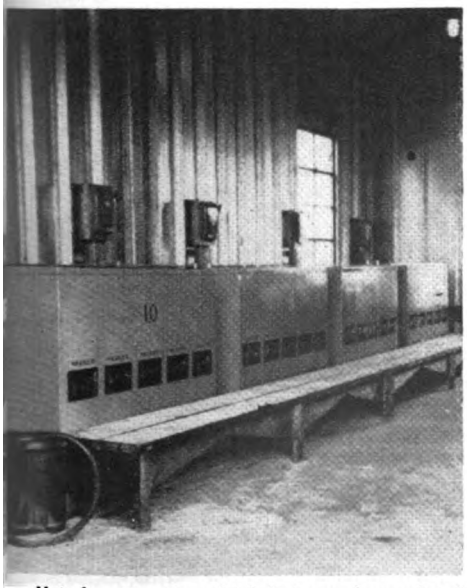
Inbound tracks are equipped with the RMC car puller and counterweight towers. Wheel storage area at far right has capacity for 450 wheel sets. Storage is arranged for crane handling.

hoists for handling side frames. Retractable hose reels mounted on the mast of each jib crane supply car oil, compressed air, cleaning solvent, and oxygen and acetylene. Electric welders, mounted overhead at each track, are also equipped with retractable cable reels.

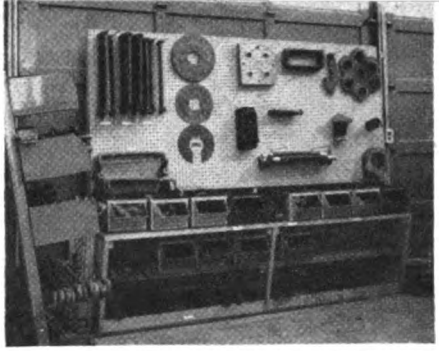
The building has continuous overhead doors along the north and south walls. Eight natural-gas infra-red heaters are spaced above each track between the jib crane installations to heat the work areas. Clear plastic panels in the roof and side walls give maximum daylight illumination. There are high-intensity, mercury-vapor floodlights for night operation. All piping is color coded: yellow - acetylene; orange - solvent; green - oxygen; black - car oil, and gray - air. Speaker and intercom systems make possible contact with the inbound and outbound leads, the yard master, the heavy repair work area, and the wheel track.

The repair facility operates constantly. Two carmen are assigned to each track on each of the three shifts. Three additional carmen are assigned on each shift—an air-brake man, a write-up man, and a lift-truck operator. Supervision includes day and night general car foremen, and one foreman for each shift. The wrecking crew, consisting of eight carmen supervised by the general car foreman, handles heavy car repairs in addition to cleaning track duties and rerailing of equipment.

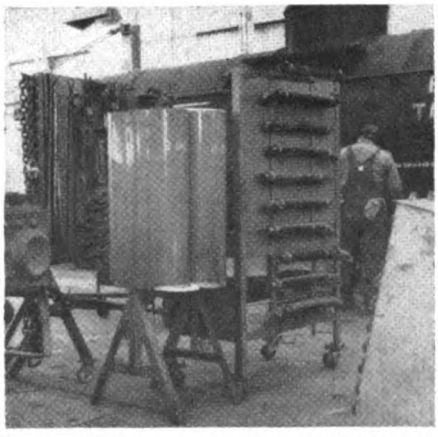
Facilities, in addition to the repair building, include an office, locker room, boiler and compressor room, and stock room. A separate lube pad building is equipped with four vats capable of saturating a total of 800 pads. Oil heated to room temperature is pumped into the soaking vats and is drained after the proper interval, leaving the pads ready for application. Pads removed from cars are shipped to the Milwaukee, Wis., shop for renovation and repair. Tracks in the wheel storage area are laid out on an angle to the service roadway, from which a fork lift can pick up wheels without moving them onto the concrete pavement.



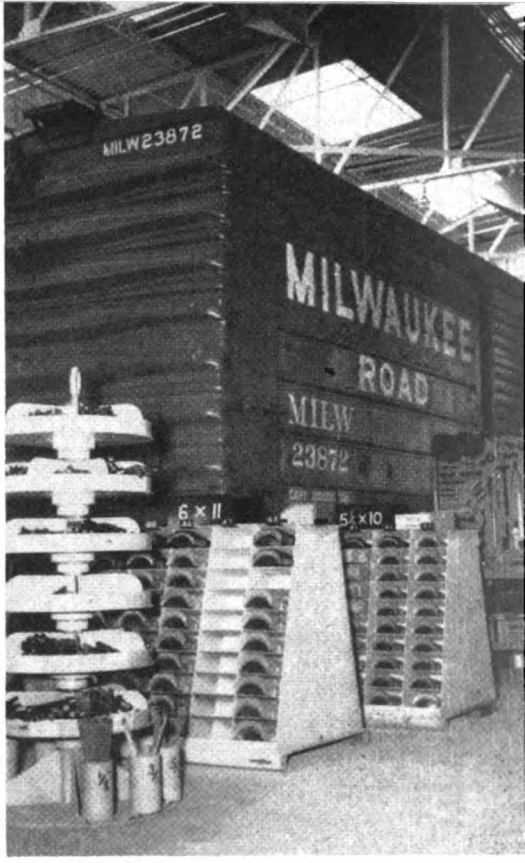
Vats for saturation of lubricator pads are dated to insure proper soaking intervals.



Peg boards make possible a neat arrangement of repair materials and tools in repair area.



Dust-guard dispenser was designed in shop. It is easily reached from all the repair tracks.



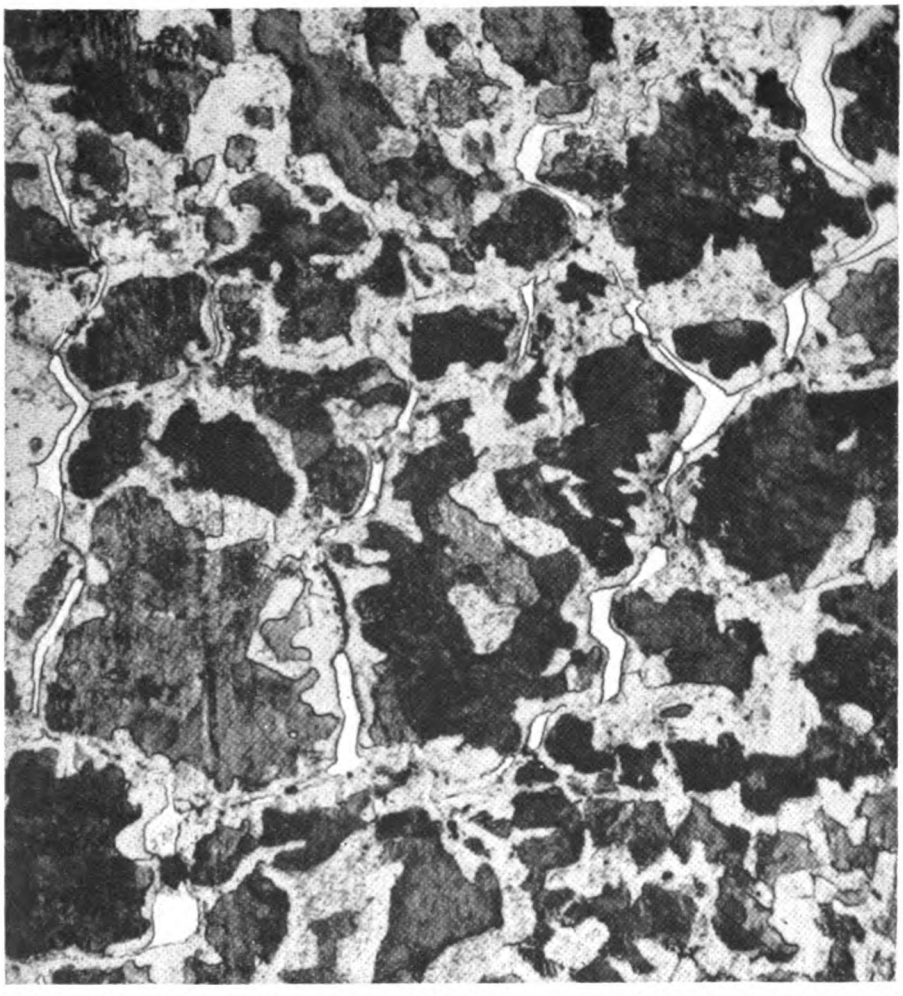
Repair parts, materials and tools are stocked conveniently at each of the repair stations.

Parts required for regular maintenance are stored and readily accessible along each track. "Lazy Susans" contain nuts, bolts, rivets, welding wire, and similar parts. Gaskets and hand tools are mounted on peg boards. Repair materials, including larger items like side frames, couplers and bolsters which are stored immediately outside, are handled in and out of shop by lift trucks.

Cars are carded for the shop in the receiving yard where both eastbound and westbound cars are inspected on arrival. During humping, shop cars are switched to one track on the south side of the classification yard. Cars requiring normal light repair are moved to an available service track, usually in nine-car cuts. Heavy repair cars are generally moved to the wheel track, although some are repaired on Track A.

The switching locomotive spots the incoming cut of cars on a service track so the coupler of the second car is opposite a "spot" post. From here, the cars are moved by a large between-the-rails "rabbit." The operation, including movement of switches and derails, is controlled from a pushbutton panel at each track inside the building. Lights on the panel indicate locations of cars and pullers. The shift foreman handles locking and unlocking of switches to place cars on inbound service tracks and also operates the large rabbit for the initial pull. Further movement of cars is controlled by carmen.

Cars are generally moved into the shop in pairs. The second car is cut off at the doorway and the first moved to the spot position. In-date air-brake testing is done at the doorway. A compressed-air outlet is located here and there are also two more at each jib crane. Repaired cars are moved outside about three car lengths from the doorway by a small rabbit and then roll down the outbound track by gravity. Each track has a capacity of about 12 cars. The small rabbit returns automatically to the doorway. A spring switch prevents cars from being pushed back into the work areas when the yard locomotive pulls cut from outbound tracks.



Sharply outlined white areas represent copper films in the grain boundaries of an otherwise normal axle steel. Copper has been found to penetrate from the surface during overheating.



Journal burn-off, or hot fracture, indicates a single continuous heating to complete failure.



Cold break journal failure has peripheral zone with thermal checks from earlier overheating.

New York Central Research Shows . . .

Turning Removes Copper Penetration

Any discoloration of car journals because of overheating should be followed by turning to a depth which will remove all traces of copper that penetrates the axle steel from the heated bronze journal bearing. This is the conclusion of the New York Central technical research department in its study of the penetration of bearing metals into journal surfaces and subsequent journal failures.

Metallurgical investigation of hot fractures attributable to penetration of bearing metal into journals at elevated temperatures has shown that these follow a single continuous heating to failure, the so-called "burn-off." Another type of failure, usually referred to as a "cold break," also results from overheating. This fracture exhibits a circumferential zone of irregular detail from which progressive type failure has developed. The circumferential zone fracture evidences growth of thermal checks and intergranular separation resulting from bearing metal penetration during a previous overheating.

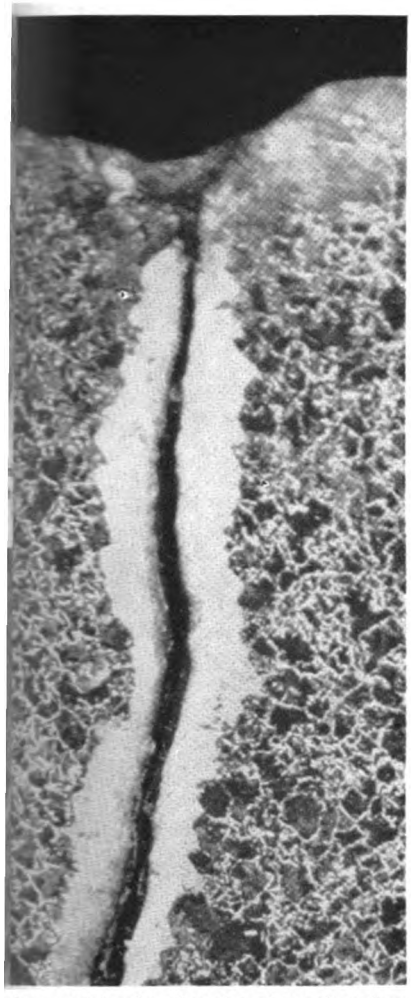
From "A Study of Copper Penetration in Overheated Journals," by T. R. Fredriks, manager —applied research, New York Central.

Copper Predominates

The predominate bearing alloy metal and the one most able to penetrate an overheated steel journal is copper. It was used by the NYC researchers as the element which determined the depth of harmful penetration. "Copper penetration" is the result of conditions that cause copper from bronze-backed journal bearings to be absorbed *intergranularly* by the hot steel journal; it is not the migration of molten bearing metal into thermal checks or cracks in the journal.

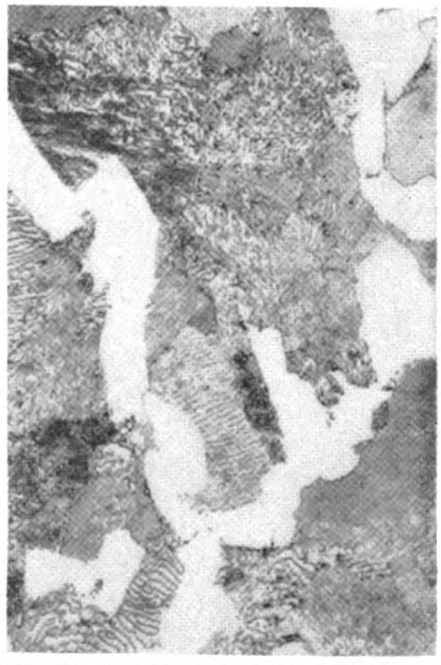
To determine the extent to which overheated solid bearing journals are damaged by intergranual penetration of non-ferrous journal-bearing material, the research laboratory selected two "burned-off" journals which had indications of a large amount of intergranular bearing-metal penetration. A transverse slice was taken from each burned-off journal adjacent to the failure. Each slice was cut into eight sections, bordering on the journal periphery. These were then analyzed spectrographically for copper.

Results of spectrographic analysis show that, at depth of 0.040 in. and greater, the amount of copper remains fairly constant and corresponds with axle steel. Additional spectrographic



ing metal migration into journal surface
k differs from intergranular penetration.





Microstructures of journal steel show that intergranular penetration is essentially surface phenomena. Micrograph from just below journal surface (left) shows the presence of copper (marked by arrows) in the ferrite regions. Micrograph of section 0.0625 in. below journal surface (right) shows no evidence of copper penetration.

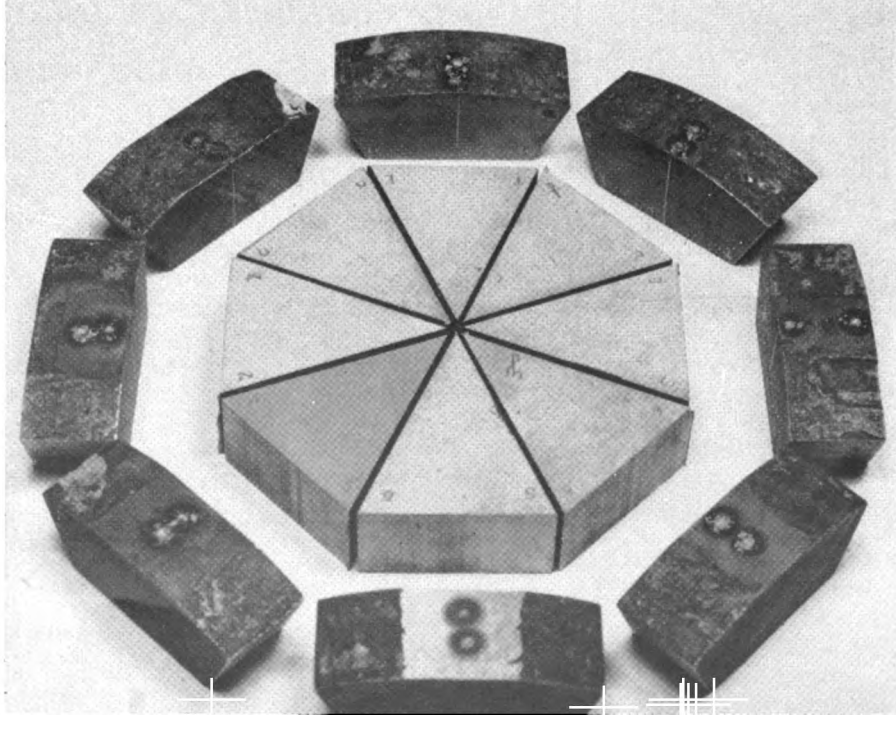
alyses of both journals 1 in. below journal surface yielded results nparable to the values obtained at depth of 0.040 in. in the periphial npling. These low percentages 04 and 0.075%) of copper apparly represent residual quantities.

Metallographic study disclosed that pper is not present as a grain bouny phase at depths greater than 0.040 Slightly below the journal surface pper films are in the ferrite regions. rmal microstructure of pearlite and rite with no copper in the grain ndaries were at a 0.0625 in. depth ow the journal surface. It was conded that injurious penetration of pper or other non-ferrous metals inthe steel did not go deeper than 40 in. even under the most severe ting conditions.

t should be possible to avoid "cold ak" fractures resulting from journals having low fatigue life caused by non-ferrous metal intergranular penetration and also to conserve journal material and prevent the scrapping of axles that can be restored to serviceable condition.

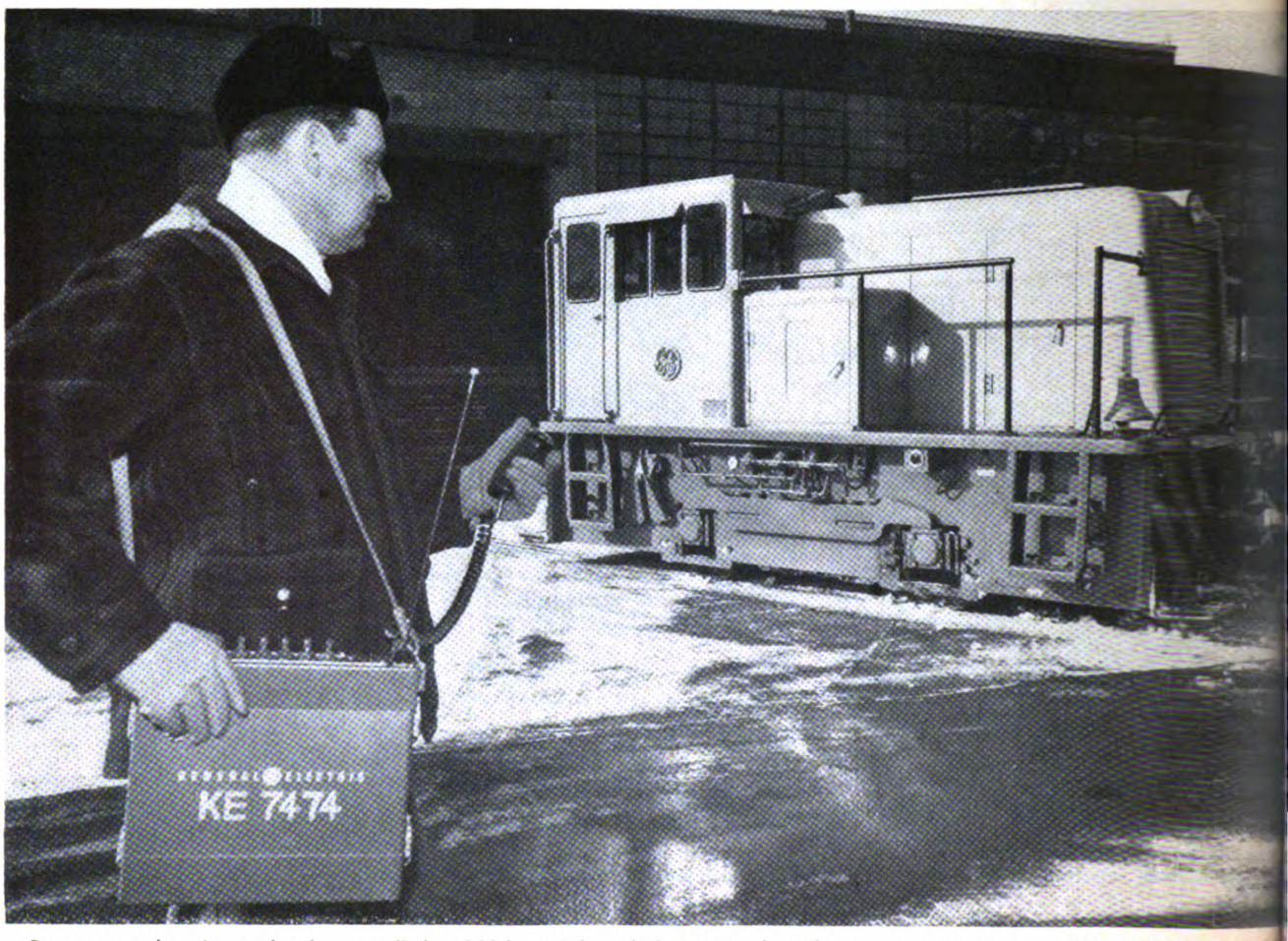
Turning Recommended

It is the recommendation of the NYC technical research department that any journal discolored from overheating, regardless of the severity, should have at least 0.0625 in. removed from the surface (0.125 in. on the diameter) at the smallest diameter. If the journal is cut, grooved, or gouged, the .0625 in. should be measured from the point at which this damage is "cleaned up." After the journal has been turned, it should be thoroughly examined for cracks by wet Magnaflux or Magnaglo and visually for any indication of migration of bearing material into thermal checks or cracks that may have resulted from overheating. If, in the judgment of the wheel shop foreman, inspector, or machine operator, the journal will not finish within the shop condemning limits, it should be scrapped before machining.



of axle, used to determine depth of
er penetration, was sectioned and
succeeding sample was machined to
0 in. greater depth for analysis.

ELECTRICAL SECTION



Remote control equipment has been applied to 150-hp switcher which is presently undergoing tests at the General Electric locomotive pla

Radio-Controlled GE Locomotive

Remote control of an industrial switcher has be possible with development of special transmitt

By N. N. Turner

The first remotely operated, radio-controlled General Electric locomotive, which was exhibited last fall for the American Short Line Railroad Association, has been designed to fill a growing demand for a locomotive which can be controlled by an operator situated at a distance from the locomotive. Control of its functions is maintained by radio communication between a portable transmitter carried by the operator and a receiver mounted on the locomotive with a maximum range of approvimately one-quarter mile (RL&C, Nov. 1960, p. 21).

Remote locomotive control may be desirable in hazardous locations, or where improved visibility from a remote position may lessen the chance of personnel injury or equipment damage. Improved visibility may make possible more efficient performance, for instance, in loading hopper cars if the operator can observe the loading and move the locomotives as needed. Remote operation also increases the operator's versatility by allowing to perform other duties.

Radio control equipment co of three principal groups: a por transmitter, a receiver, and the as ated control equipment on the motive. The present transmitter in. by 10½ in. by 12 in. and wei 15 lb, is to be replaced by a co model of only half the size and we On the transmitter top are the co switches and "deadman" safety sw The transmitter is completely w tight. The rechargeable battery in the transmitter is designed to

Mr. Turner is in Locomotive and Car Equipment Department of General Electric at Erie, Pa.

the equipment over a normal work- day and can be recharged over- ht. Stationary transmitters are also ilable.

In operation, the transmitter emits continuous carrier which keeps a il-safe" pilot relay in the receiver the closed position, forestalling ergency power and brake condi- ns. On the transmitter control func- ns are initiated with momentary- ntact, on-off switches. The trans- tter also has a power on-off switch d a "power-on" indicating light. The adman switch, which removes the rrier in case of operator failure or ner emergency, is a hand-operated it which must be held depressed by e operator at all times when he is ntrolling the locomotive. The re- iver, adequately shock mounted on e locomotive, converts the signals om the transmitter into appropriate comotive control functions. Like the ansmitter, the receiver enclosure is mpletely watertight. Power for op- ation of the receiver is obtained from auxiliary power supply driven by e diesel engine.

Receiver output operates six pilot lays, two in combination for each of e ten controlled functions plus one r the "fail-safe" feature. Each relay as contacts capable of interrupting inductive load of 2 amp at 37½ olts d-c. The five control relay con- cts are normally open, closing only s selected by the remote transmitter. he relay for "fail-safe" feature is pen when de-energized and closes hen the equipment is in normal op- ation.

The operator's panel and controls n this locomotive appear much the me as those found on an ordinary anually controlled locomotive, with e exception of two switches on the age panel labeled *Manual-Remote* nd *Radio Power*. Transition from anual to radio remote control is mple.

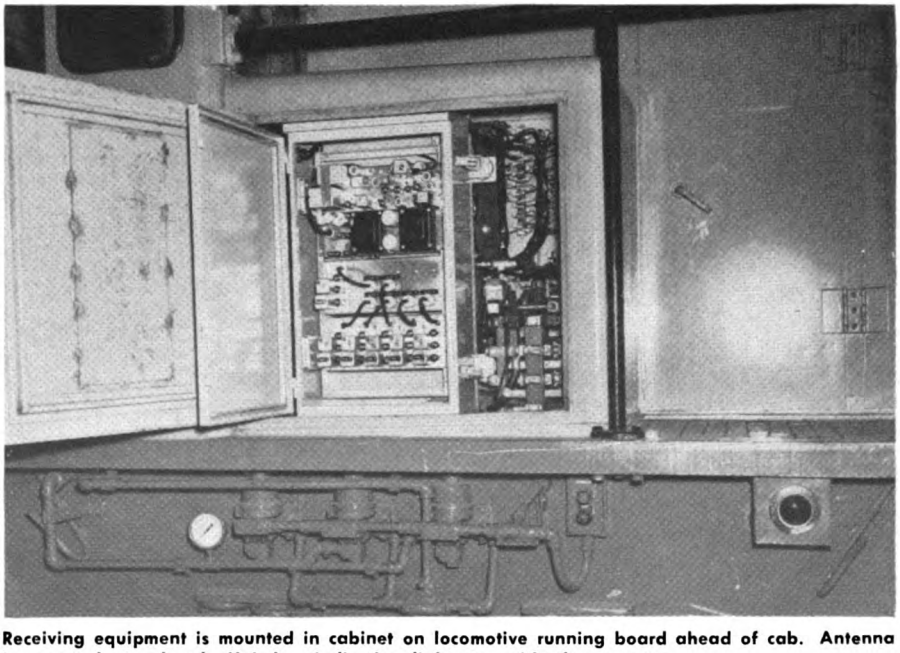
The locomotive is first started in the ormal manner. After air pressure is umped up and the engine warmed up, he operator places the *Radio Power* witch in the *On* position. He then oves the throttle handle to *Idle*, laces the reversing switch in neutral, nd the brake valve in the *Release* po- ition. Finally, he moves the *Manual-Remote* switch to the *Remote* position, causing an immediate brake applica- ion, which continues until the opera- or takes control at the remote station.

Safety control on the locomotive consists of interlocking which prevents application of power to traction motors, applies brakes, and holds the engine at idle speed. It will be operated by release of the deadman switch, by malfunction of the radio equipment, or when receiver moves out of range of the transmitted signals. None of the other functions on the radio transmitter can be operated until this safety control has been put in the operating position. When the operator at the remote station presses his deadman safety switch, the safety control on the locomotive releases the brakes and places the locomotive in readiness for remote control operation.

Control of the locomotive brakes by the remote operator is accomplished through use of a single-pole, double-throw, momentary-contact control switch on the transmitter. Moving the switch in one direction causes a brake application; movement in the opposite direction releases the brakes. When this momentary switch is moved in the brake application direction, a magnet valve on the locomotive allows air to feed to the brake cylinders until this switch is released. When the switch is released, brakes lap and hold the pressure in the cylinders at the time of release. This pressure is maintained until the brakes are released through movement of the switch on the transmitter to the brake release position, or until the brake pressure has bled off through normal leakage. Operation of the brake-release switch will cause air to be exhausted from the brake cylinders until the switch is released, or until the air is completely exhausted. An emergency brake-magnet valve, used in conjunction with the safety control, is arranged so that it will override the brake-release magnet valve to allow instant application of the brakes and



Portable transmitter has series of toggle switches on top for control of locomotive functions and has deadman safety switch on extension cord which must be held by operator.



Receiving equipment is mounted in cabinet on locomotive running board ahead of cab. Antenna is mounted atop hood. Unit has indicating lights to guide the operator.

prevent air being bled off by the brake-release magnet valve.

Direction of locomotive motion is selected by operation of the *Reverse-Forward* switch. Like the brake-control switch, this is also a single-pole, double-throw, momentarily-operated switch with a center *Off* position. Operation of this switch causes air to be fed through a magnet valve to move the electro-pneumatic reverser and set up circuits which give the direction of motion desired. Proper interlocking of control circuits prevents operation of this reversing switch either in manual or remote operation when the throttle is at any position other than idle.

The diesel engine throttle control on the locomotive is of the air-operated type. It consists of a master air piston mechanically connected to the manually operated hand throttle in the locomotive. This master piston controls a slave piston mounted on the engine and connected to the engine fuel control. Any change in position of the piston on the master air cylinder causes a change in position on the slave cylinder and a corresponding change in engine speed. In remote operation, the slave piston on the throttle is actuated by either one of two solenoid valves, one of which admits air to this slave piston, while the other exhausts air from the piston. These are controlled, respectively, by the *Throttle On* and *Throttle Off* switches on the transmitter. Selection of engine speed is available over the complete range from idle to full speed. Application and release of the *Throttle On* switch on the transmitter will cause the engine to hold the speed at the time of release until the *Throttle On* or *Throttle Off* control on the transmitter is again actuated. This throttle control is interlocked so that operation of brakes will return the throttle to the idle position.

For each of these locomotive functions—brakes, forward-reverse selection and throttle operation—there are indicating lights provided on the exterior of the locomotive. These show the operator whether or not his brakes are applied, whether his throttle is at idle, and in which direction the locomotive is set up to operate.

In addition to these basic functions the radio equipment can also remotely control other functions on the locomotive, such as bell ringing, whistle, sanding, uncoupling, and car dumping. The radio control equipment conforms to existing federal requirements governing the operation and construction of such apparatus. It is capable of performing ten independent functions none of which is transmitted simultaneously. Provision is made for future installation of additional functions.

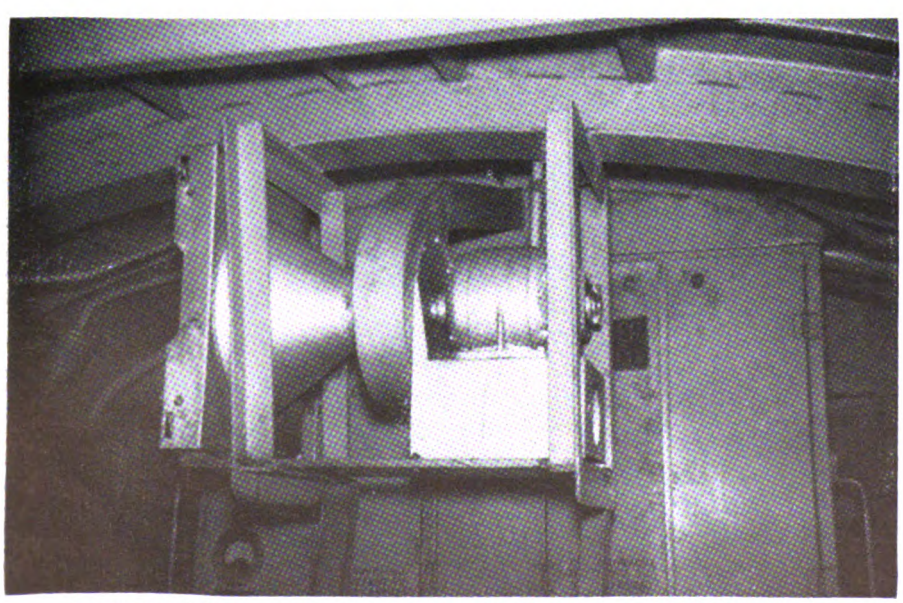
The pilot locomotive is presently in service at the General Electric plant in Erie, Pa., where it is undergoing evaluation in industrial switching

Pressurizing Pays Off for B&O

Electrical controls, the nerve system of the diesel-electric locomotive, must be kept clean and in good working order to prevent road failures. Dust, lint, and oil vapor from the engineroom which can accumulate on contactor and interlock surfaces in control cabinets may cause burned spots, making controls inoperative.

Service tests made by the Baltimore & Ohio indicate that the pressurizing of the control cabinets excludes contaminated engineroom air from these cabinets, keeps cabinets and controls clean, saves on maintenance, and helps to reduce road failures.

Using the EJB pressurizing assembly kit made by the E. J. Boyle Co., the B&O has now made several installations which deliver clean air under pressure to the tops of the control cabinets. To date, the EJB kits have been applied to nine locomotives—three Alco road freight units and six GM road freight units. First B&O installation was made 34 months ago.



Pressurizing kit has been applied without complication on Alco and EMD road diesels.

There have been no special application problems; one of the kits can be installed on a road freight unit in about 4 hr.

Air pressure developed within the cabinet depends on its size, but the normal range would be 1 to 8 oz above atmospheric pressure. Tests indicate that pressurizing will materially increase the maintenance intervals at which the cabinets and controls require cleaning and at which the controls require adjustment.

Inspection of controls in one cabinet which has been protected by an EJB kit for two years showed the controls to be in very good condition. Indications were that it would be possible to continue to operate this unit for an even longer period with nothing but normal inspection.

The B&O estimates that savings made by extension of maintenance periods and by elimination of road failures will amortize the investment in this kit and its installation costs in approximately one year.

new
all-weather plastic coating strips off clean... in seconds!

Slashes journal cleaning costs 30¢ to 50¢ ...keeps journals *wheel-shop* bright!



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Doc Discusses Low-Throttle Diesel Operation



By Gordon Taylor

Engineman Tom Hacker was disturbed when he saw the string of cars added to his train at River Junction. He already had a long train. With these extra cars, he knew he was faced with a "drag" pull on some of the grades ahead. He told this to the conductor while the River Junction switcher was adding the cars.

"So what?" the conductor responded. "Just take it slower and you won't hurt your precious diesel."

"That's what you think," retorted Hacker. "Slow movement with a very heavy train registers more amperes on that load meter, and those amperes are responsible for most of the heat in the motor. When we get home, I will ask Doc Watts at the Diesel House about this."

When Hacker saw Watts, he said, "I wish you'd set me straight on something. How long will it take to do damage to a traction motor drawing 500 amp with throttle open to Run 2?"

"That's some question," said Doc, "one that even the builder would have trouble answering. I'll say that you are correct in being concerned about slow speed operation with heavy currents, so let's go over this if you have time."

"Go ahead," said Hacker. "This is important to me."

"It's like this," Doc went on, "heating effect in an electric motor is proportional to the number of amperes squared, times the ohms of resistance in the windings. In other words, amperes times amperes times ohms. In a formula it is shown as I^2R. Because resistance in such a circuit is of very low value, the currents, or amperes, flowing largely determine the heating effect. The length of time that the motor is subjected to heavy currents is also important. Periods of light load, or drifting, between intervals when heavy currents are used do give the motors opportunities to get rid of some of their accumulated heat. It is important for the traction-motor-blower fans to operate at higher speeds to cool the motors.

Resistance Calculation

"Now, let's go back to the formula I^2R to figure the watts that heat the motor. When we multiply amperes by amperes, it means something you might not think of at first. It means that the heating effect varies as the square of the current, or put another way, if we were to double the amount of current in the motor, we would have four times the heating effect. If we were to triple the amount of current in the motor, the heating effect would be three times three, or nine times the original heating effect. You can see the importance of holding amperes within a reasonable limit.

"Watts which move the train are expressed as watts equal volts times amperes, or E times I. You can see that when power watts are mad largely of voltage that the heating fect of amperes is minor. In o words, it is better to operate at hi voltage and thereby develop the ne sary power with lower current v

"From this we learn that amp are needed for tractive effort to s heavy trains and that volts are ne to step up train speed, with use of f amperes. Is this clear?" asked D

"Yes, I can understand most of replied Hacker, "but now tell me amperes drop as train speed increas

"Good question," said Doc. "Th are two things limiting the flow of rent in a motor. They are the re ance (in ohms) of the wire in windings to the flow of current second but of most importance. counter electro-motive force, or c ter voltage generated in the m winding. This counter voltage opp the voltage that is fed from the g erator to the motor and effectivel duces the amount of amperes tha motor will accept from the generat

At this point, Hacker said, "D can you make this counter voltage a bit plainer; I am not familiar with

"You can run up against a sim situation," said Doc, "every time start your car. When you crank engine, it draws a heavy current f the battery. With the engine runn the generator starts charging the b tery at a heavy rate. It can do this cause the battery voltage is too lo effectively oppose the generator v age. The battery accepts the h amperes for a little while, during w

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

attery charge is restored to the where its own voltage more nearuals that of the generator. The er voltage from the battery re- the current from the generator he charging continues at a re- l rate. That is another example unter voltage at work.

ow we'll return to counter volt- enerated in traction motors. The r armature revolving in a mag- field sets up the counter voltage. ie armature starts to turn in its magnetic field, it begins to funcis a generator as well as a motor enerates a voltage that is opposed e voltage of the main generator. is called counter voltage. The int of counter voltage depends on notor armature speed and field gth. At low speed, the armature ates low counter voltage and ac- higher amperes from the gen- r. At higher speed, the motor rates higher counter voltage, h means it is more effective in re- ig the amperes supplied by the rator. Remember, volts represent ressure that causes amperes to

nter Voltage

t is a good thing that electric moproduce counter voltage. Things ld be in a mess without it. The rical resistance of the motor wind- is so low that, without counter ige, it would be like connecting generator to a short circuit. The tance value, alone, of the motor iit simply could not limit the arm- e current to a safe value.

Now," said Doc, "we will return our original question. How long you safely operate diesel traction ors drawing 500 amp when the en- throttle is in the Run 2 position? t question has come up before, and iave never had a firm ruling on it, i from the builder's representative. ive made some estimates of my which may help you. These are :d on certain values that the builder approved.

Consider some older model units, i as Model F-7 wired for dynamic king. When dynamic braking was d. the throttle was placed in 'Idle' ition, and the transition lever was off' position. Any other position uld defeat the purpose of the brake, n if it were possible. During dyiic braking, the throttle was left in e' position and the engineman regulated the amount of braking effort by moving the handle of the transition lever. The load meter had a red triangle on the indicating scale at the 600-amp mark. A brake warning-light would light up to indicate that the traction motors were generating the maximum amount of braking current allowed. This 600-amp limit was set for the protection of traction motors and the brake-resistor grids.

"Now we have established the fact that the builder approved the operation of traction motors with the armatures producing 600 amp when the engine throttle was in 'Idling' position; that is, the engine, generator and alternator were all operating at 275 rpm, which means the traction-motor blower fans were operating in their lower speed range.

"To answer the original question, we now compare the heating effect of 500 amp passing through the traction motor when pulling as compared with the heating effect of 600 amp passing through the armature of a traction motor in dynamic braking service. When operating with the throttle placed in No. 2 position, the engine would be running at 350 rpm. This would cause traction-motor blowers to operate at slightly higher speed than would be the case with unit in 'braking service' with engine speed of 275 rpm.

"With these facts in mind, it is my opinion it would be as safe to operate at 500 amp when pulling as to operate at 600 amp in dynamic braking service. Where slow orders require reduced speed operation in throttle 2 or 3, I think 500 amp may be considered safe. As a general rule, it is better to operate at speeds that reduce ampere load, if operating rules permit the higher speed.

Short-Time Ratings

"EMD Operating Manual 2310 for F-7 units suggests operation using short-time rating be in Throttle 5 or higher. This will provide adequate air from the traction-motor blowers to provide proper ventilation and cooling of motors. It also means that locomotive speed will be higher on the grade and that the *time* in overload will be held to a minimum. Of course, in starting or accelerating a train, the amperage will be high in the low throttle positions, but, if the locomotive is not completely overloaded, the amperage will reduce as the speed picks up and the load meter will soon show a safe value.

"When locomotives are to be operated at slow speed and high tractive effort, as in a hump yard, special hump controls are used. Hump control is a method of control of generator excitation in which the throttle is advanced adequately and excitation is controlled to give proper hump speeds."

Doc then said to Hacker, "I would like to tell you about a case that happened several years ago when we first got diesels. A small 44-ton unit was involved. It was operated by an engineman who was not much concerned and took no trouble to learn. A long drag of freight cars had to be moved to a train yard about four miles away. When the locomotive turned in at the end of its shift, it was really hot; the generators and motors were like stoves. The engineman said, 'I don't understand it. I knew the load was heavy, but we did not stall; we kept moving at about 2 mph. I did not think the unit would be working too hard at such slow speed.' He simply did not understand that it takes higher speed than 2 mph to generate the counter voltage that holds the ampere load to a safe value. The 2-mph speed imposed by heavy drag just invited in more amperes than the motors could safely handle. The result, some badly overheated motors and generators that required expensive repairs.

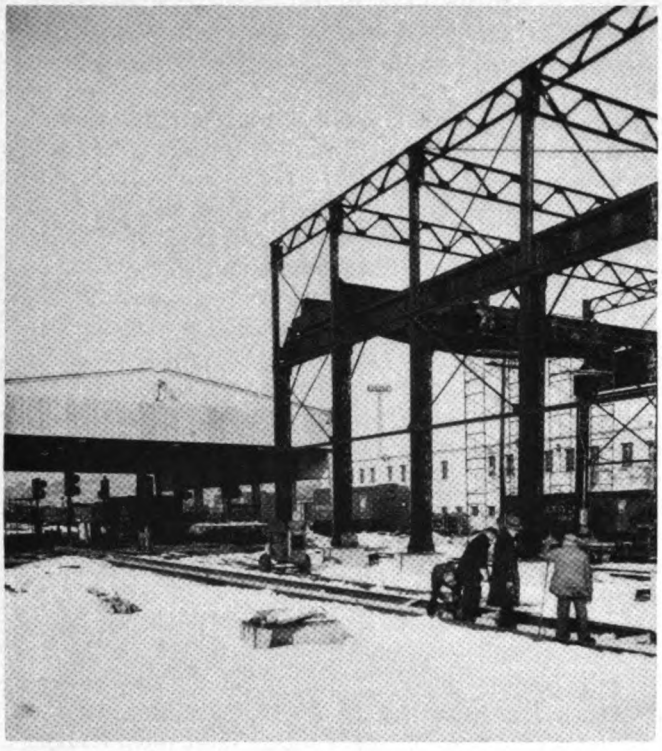
"In recent years, the builders have done much to improve the ability of traction motors to handle heavy loads. This has been accomplished by the use of new insulating materials and methods of application to improve motor ventilation. The improvement has been so great that the load meters on later model units do not have a red zone on the load meter scale. This red zone was used on the load meters of early model units to warn that the ampere loads indicated in that zone could be used for limited periods only.

"I believe," continued Doc, "That this wraps up this matter. If you have other questions that I can help you with, please call on me. It is refreshing to find someone who wants to learn more about his job. Today, I have learned just how to classify you."

"What do you mean by that?" said Hacker.

"Well," said Doc, "in my book there are just two kinds of people in the world—some folks live and learn; others just live. You belong to the first group."

Pennsy 'Spot' Repairs



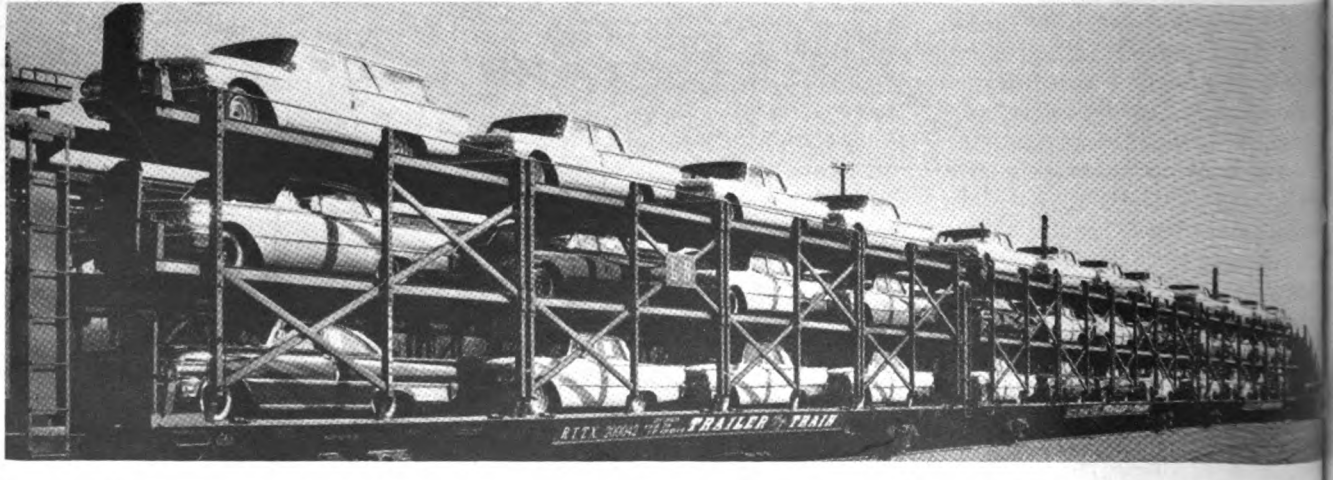
"Largest" classification yard—Pennsy's Conway Yard near Pittsburgh, Pa.—is currently being equipped with a $1-million facility to make light car repairs. Interesting feature will be 40-ton overhead crane with push-button controls (right) which is being installed to adjust and transfer loads. Repair shelter is 70 x 120 ft and is equipped with radiant heated working platforms, high intensity illumination, and efficient tools. It has two through tracks, one of which will be equipped with mechanical car puller, or rabbit. Cars on the other track will be moved by a Trackmobile. The new shop is adjacent to, and will handle cars from, the eastbound receiving and classification yards. It complements a smaller shop which went into operation last year in the westbound yard. During 1960 a total of 1,692,036 cars moved through the eastbound and westbound yards. Of these, 31,000 required repair work at Conway shop.

D&H Materials Handling



Two Austin Western Model 110 hydraulic cranes put into serv by the Mechanical Department of the Delaware & Hudson h been found to give great flexibility in the materials handling op ations at D&H car maintenance facilities. They have been fou equally useful for indoor and outdoor handling jobs. Telescop boom and hydraulic controls make it possible for the crane pick up and deposit loads in box cars without difficulty. Am the requirements for cranes as listed by the D&H were: 1) Op tor has to see load at all times; 2) boom and swing have to power actuated; 3) controls have to be compact and easily m aged, and 4) boom has to be extended and shortened hydraulic for easy operation and to save time. Full use of hydraulics p vides smoothness of operation; permits inching of loads to pre position without jarring or slipping, and gives operator cons and positive control.

TTX Tri-Levels Undergo Impact Tests



Lo-Dek flat cars equipped with Dana Corp. Tri-Level auto racks underwent tests at the Pullman-Standard Research and Development Center in Hammond, Ind. Resilient racks, fabricated in 20-ft sections, are mounted on the 85-ft TTX cars which were also fi with P-S 10- and 20-in cushion underframes to test their comp tive performance at impact speeds up to 10 mph.

Report

(*Continued from page 5*)

been lowered to the thermostat setting. Cooling fans are then stopped by the thermostat, and the motor-operated dampers in front of the cooling fans automatically close, preventing air flow through the bunkers resulting from natural convection. As lading air temperature rises to the thermostat setting, controls open the dampers and restart cooling fans.

The thermostat control range is from 30 to 70 deg F, with control settings in 5-deg increments. A "Heater Service" switch reverses the action of the cooling fans which stop when the temperature rises to the desired point.

With the constantly operating fans and with thermostats for controlled temperature, PFE says many commodities can be loaded higher in the car with adequate air circulation and refrigeration. Tests run over the past year and a half are said to have been very successful. It is felt that the Ice Tempco cars "will be so helpful in the interim period when mechanical refrigeration cars are not yet available in sufficient quantities," a representative of one growers group commented recently.

Consideration is being given to equipping still another 500 cars with the Ice-Tempco system. All would be completed and in service by August of this year.

Improved Release Test Now Alternate Standard

An improvement to the Standard Passenger Car Single Car testing device to detect with greater certainty causes for failure and help eliminate potential causes of stuck brakes is noted by the AAR Mechanical Division.

The addition of a Flowrator By-Pass cock to the present device and changing to a special rotary valve provides a more restrictive release test. The Flowrator By-Pass cock is that presently used with the Freight Car Single Car testing device except that the lower ball stop has been changed to include a No. 66 drill orifice. All future ½-in. diaphragm cocks manufactured with integral Flowrator assemblies will have a large "P" cast on the body and a downstream connection for the brake pipe gage tube. Assemblies with the symbol "P" may be used with either passenger or freight car devices. Those without will be used only on the freight car device.

New Single Car Testing devices may be purchased complete with this feature, or the required parts may be obtained in kit form for application to existing devices.

No Change in Passenger Car Axles

Center diameter of the 6½ by 12 in. passenger car axle, dimension "k" on AAR Manual page D-3, will not be changed, the Mechanical Division advises. Any such change would affect Spicer drive attachments which are fixed to the axle in this area.

Manual page D-3 was inadvertently included in the recommendation of the Committee on Axles for increases in diameters of the centers of larger axles, which was approved by Letter Ballot. The increase from 6⅞ in. to 7⅜ in. applies only to the standard and alternate standard 6½ by 12 in. freight car axles and will be effective on March 1. The change resulted from studies of numerous axles which failed under cars in ore service.

Elber Retires

C. C. Elber has retired as secretary, Electrical Section, Engineering and Mechanical Divisions. Functions of the section have been absorbed by the two divisions (RL&C, Dec. 1960, p 5).

L&N To Spend $36 Million For Equipment in 1961

The Louisville & Nashville will spend about $36 million for equipment in 1961. In addition to the 900 70-ton hopper cars and 900 70-ton gondolas ordered from Pullman-Standard, as reported in the December issue, 1,000 cars will be rebuilt at Louisville shops, and orders for additional new cars are anticipated.

No new orders for equipment have been reported since the closing of the January issue. However, the Bangor & Aroostook has acquired 200 40½-ft box cars from U. S. Railway Equipment Co. The cars will be upgraded to Class A for use in paper traffic.

The Erie-Lackawanna will repair 725 box cars at Meadville, Pa., at a cost of $1,600,000. The program calls for replacement of roofs and inner linings, and repairs to underframes where needed. The cars will be painted in gray and maroon.

The 36 lightweight subway cars ordered by the Toronto Transit Commission from Montreal Locomotive Works, as reported in the January issue, will cost $3,968,264. The 74-ft cars, reportedly the first to be built in Canada, will be constructed principally of aluminum. Delivery is scheduled for late 1962.

Personal Mention

Akron, Canton & Youngstown.—*Akron, Ohio:* F. M. MANSON appointed superintendent car department and assistant superintendent.

Atlantic Coast Line.—*Florence, S. C.:* C. E. HARPER, JR., appointed master mechanic. *Savannah, Ga.:* D. E. MULLIS appointed general foreman. *Rocky Mount, N. C.:* F. A. GRAY appointed master mechanic. *Ocala, Fla.:* G. C. HARRIS appointed road foreman of engines.

Canadian National.—*Montreal:* L. S. MCGREGOR, general superintendent of motive power and car equipment, Central Region, at Toronto, appointed chief of motive power and car equipment, succeeding ERIC WYNNE, recently named vice-president of newly created Great Lakes Region.

Mr. McGregor became an office boy in

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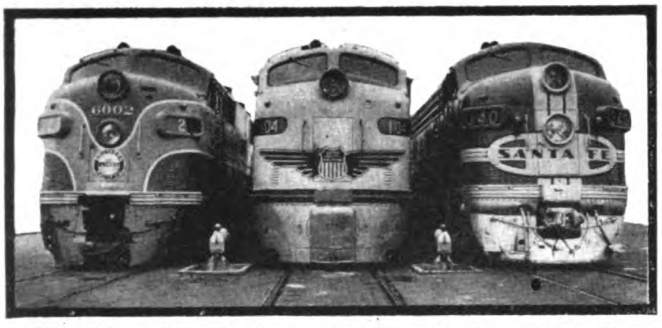


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L. S. McGregor

the motive-power department of the CNR in 1926. He attended McGill University, graduating with a mechanical engineering degree in 1936, while completing his apprenticeship in CNR shops during summer months. Subsequently he was assistant foreman, inspector, assistant engineer in Montreal, superintendent of motive power and car equipment, Northern Ontario district, and general superintendent of motive power and car equipment for the Central Region.

Chicago & North Western.—*Chicago:* W. J. WEATHERALL appointed general superintendent—car department.

Erie-Lackawanna. Mechanical department officers of merged roads—*Cleveland:* C. K. JAMES, superintendent motive power; W. G. CARLSON, assistant superintendent motive power; K. H. CARPENTER, superintendent car department; L. E. SCHUETTE, assistant superintendent, car department staff; D. H. DECKER, assistant superintendent, car department, Eastern District; E. D. HALL, mechanical engineer, and G. E. MCKINNEY, chief electrical engineer. *Meadville, Pa.:* A. HUGHES, assistant superintendent, car department, Western district.

Fort Dodge, Des Moines & Southern.—*Boone, Iowa:* DAHRL WRIGHT appointed master mechanic, succeeding J. E. PURDIE, acting master mechanic, retired.

Louisville & Nashville.—*Louisville, Ky.:* C. N. WIGGINS appointed assistant general manager. C. A. LOVE appointed chief mechanical officer, succeeding Mr. Wiggins. J. R. DOUGLASS appointed assistant chief mechanical officer, succeeding Mr. Love.

New York Central.—*New York:* R. L. MARTIN and L. W. BRENNAN appointed general supervisors locomotive maintenance.

St. Louis-San Francisco—*Springfield, Mo.:* L. I. BUFFINGTON appointed assistant to chief mechanical officer.

Soo Line. (Mechanical Department personnel of newly merged Minneapolis, St. Paul & Sault Ste. Marie and Duluth, South Shore & Atlantic.)—*North Fond du Lac, Wis.:* EDWARD W. BEYER named shop manager. *Minneapolis* (formerly with MStP&SSM): EUGENE R. HENKEL, superintendent motive power, now manager, Shoreham shops. HERBERT H. LINK, master mechanic, named chief diesel supervisor, Shoreham. ROY D. JOHNSON, supervisor standards and methods, named diesel supervisor, lines west of Minneapolis. FRANCIS A. WEISS, superintendent locomotive shops, now assistant manager, Shoreham shops. *Stevens Point, Wis.:* JOHN BENZ, mechanical supervisor, named diesel supervisor, lines east of Minneapolis.

Southern. — *Jacksonville, Fla.:* JAMES R. JULIAN appointed general foreman. Formerly general foreman at Alexandria, Va. *Charleston, S. C.:* CLAUDE M. MONTGOMERY appointed road foreman of engines.

Supply Trade Notes

SUPERION CAR DOOR COMPANY.—Chicago sales office moved from 332 South Michigan ave., to general offices at 1928 W. 46th st., Chicago 9.

■

UNITED SPECIALTIES INC. — *H. Y. Martindill* appointed general manager. *Incorporated Sales Industries*—J. A. Rupiper, K. K. Palmer, and G. R. Childress—Houston, Tex., named exclusive manufacturers representative, northeast Texas and western Louisiana.

CAR FOREMAN required for well established Car Shop in Chicago area. Excellent opportunity for right man. Furnish full record of experience with application. All applications held confidential. Box 10, RAILWAY LOCOMOTIVES & CARS, 30 Church St., New York 7, N. Y.

■

ARCAIR CO.—*Donald E. Shryock* appointed field representative in midwest.

■

AIR-MAZE DIV., ROCKWELL-STANDARD. —Air-Maze Corp. now operating as Air-Maze Div. of Rockwell-Standard.

■

RAILWAY SERVICE & SUPPLY CORP. —National sales offices established in Railway Exchange Building, 80 E. Jackson Blvd., Chicago. *F. B. Harrison, Jr.*, vice-president, directs sales operation. Mr. Harrison also heads Harrison Railroad Supply Co. *Thomas W. Timmis*, assistant vice-president, continues to represent corporation in midwest.

■

AIR REDUCTION SALES CO., A DIVISION OF AIR REDUCTION CO.—*L. W. Kunkler* appointed district manager at 1276 Military Road, Buffalo, N. Y., succeeding *R. H. Merriman*, now district manager at Allegheny and 17th st., Philadelphia, Pa.

■

CHICAGO MALLEABLE CASTINGS CO.—*Frank K. Veasman* appointed manager, and *Thomas J. Kemble*, assistant manager, railroad division.

■

NATIONAL MALLEABLE & STEEL CASTINGS CO.—*Howard W. Brandt* appointed vice-president and group executive.

■

MAGOR CAR CORP.—Sales and executive offices moved from 50 Church st., New York, to 660 Van Houten ave., Clifton, N. J.

■

GENERAL ELECTRIC CO. — *Oscar L. Dunn*, general manager, Motor and Generator Div., Erie, Pa., elected a vice-president of G. E. *Gail B. Hamilton, Jr.*, appointed manager of a new Process Automation Sales operation at GE's Industry Control Department, Salem, Va. Department established to examine and develop control equipment specially designed for integration into automated process control systems.

■

CHICAGO RAILWAY EQUIPMENT CO.—*David W. Wallace* elected president, and *Donald E. Barton*, vice-president —

Railroad Equipment Division. Chicago sales office moved from 332 South Michigan ave., to general offices at 1928 W. 46th St., Chicago 9.

■

C & D BATTERIES, DIV. ELECTRIC AUTOLITE CO.— *Eugene F. Leherissey*, 631 Ravine ave., Lake Bluff, Ill., now handling C & D railway sales in Chicago area.

■

FAIRBANKS, MORSE & CO. — *Thomas G. Lanphier, Jr.*, elected president. Mr. Lanphier also vice-president-planning, Fairbanks Whitney Corp.

■

ELECTRIC STORAGE BATTERY CO.— Exide Industrial Marketing Div., a sales and service organization, created to serve Exide Industrial and new Nickel-Alkaline divisions. *C. J. Moore*, Exide's vice-president—marketing, heads new division.

■

MAGNAFLUX CORP. — Magnaflux has acquired the *Metal Control Laboratories*, Los Angeles, Calif., which will be operated as a part of the Materials Testing Laboratories Division of Magnaflux.

■

NALCO CHEMICAL CO. — *David M. Jacks* and *Thomas G. Cocks* named vice-presidents.

■

EX-CELL-O CORP.—*Ford Supply Co.*— Frank Ford, Nick Swords, and Bert Hayes —appointed sales representatives for Ex-Cell-O railroads products in the southeast. Headquarters, Atlanta, Ga.

Helps from Manufacturers

RR CLEANER. Service Bulletin No. 17B describes Oakite RR cleaner, an alkaline detergent designed to remove burned-on oil, heavy grease, and dirt from railroad equipment. Used also in cleaning tank or in steam-cleaning operations. (Write: *Oakite Products, Inc.*, Dept. RLC, 119 Rector st., New York 6.)

LUBRICANT. 4-page folder describes and lists uses of CMD extreme pressure anti-scoring oil and grease, (Write: *Chicago Manufacturing & Distributing Co.*, Dept. RLC, 1928 West 46th st., Chicago 9.)

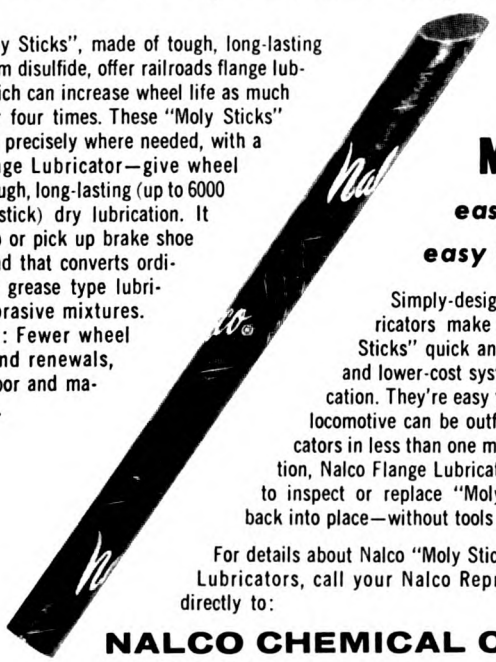
ELECTRICAL PRODUCTS. 4-page bulletin B81 electrical connectors, receptacles, switches, and lighting products includes specifications and suggested applications for standard and custom-built electrical connections, also general descriptions of lighting products. (Write: *Joy Manufacturing Co., Electrical Products Div.*, Dept. RLC, 1201 Macklind ave., St. Louis 10, Mo.)

BAND CLAMPS AND COUPLINGS. 44-page catalog No. 803 contains full product information on complete line of industrial band clamps, hose clamps, couplings, flanges, and V-band joints for all types of applications. (Write: *Marman Div., Aeroquip Corp.*, Dept. RLC, 11214 Exposition Blvd., Los Angeles 64, Calif.)

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With Nalco Moly Stick Flange Lubricant

Nalco "Moly Sticks", made of tough, long-lasting molybdenum disulfide, offer railroads flange lubrication which can increase wheel life as much as three or four times. These "Moly Sticks" are applied precisely where needed, with a Nalco Flange Lubricator—give wheel flanges a tough, long-lasting (up to 6000 miles per stick) dry lubrication. It won't creep or pick up brake shoe dust or sand that converts ordinary oil or grease type lubricants to abrasive mixtures. The result: Fewer wheel turnings and renewals, reduced labor and material costs.



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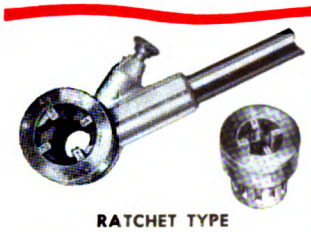
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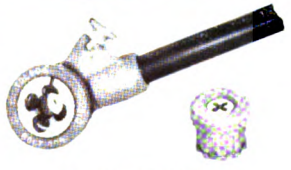
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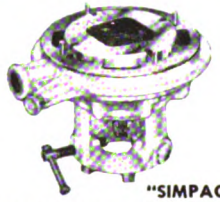
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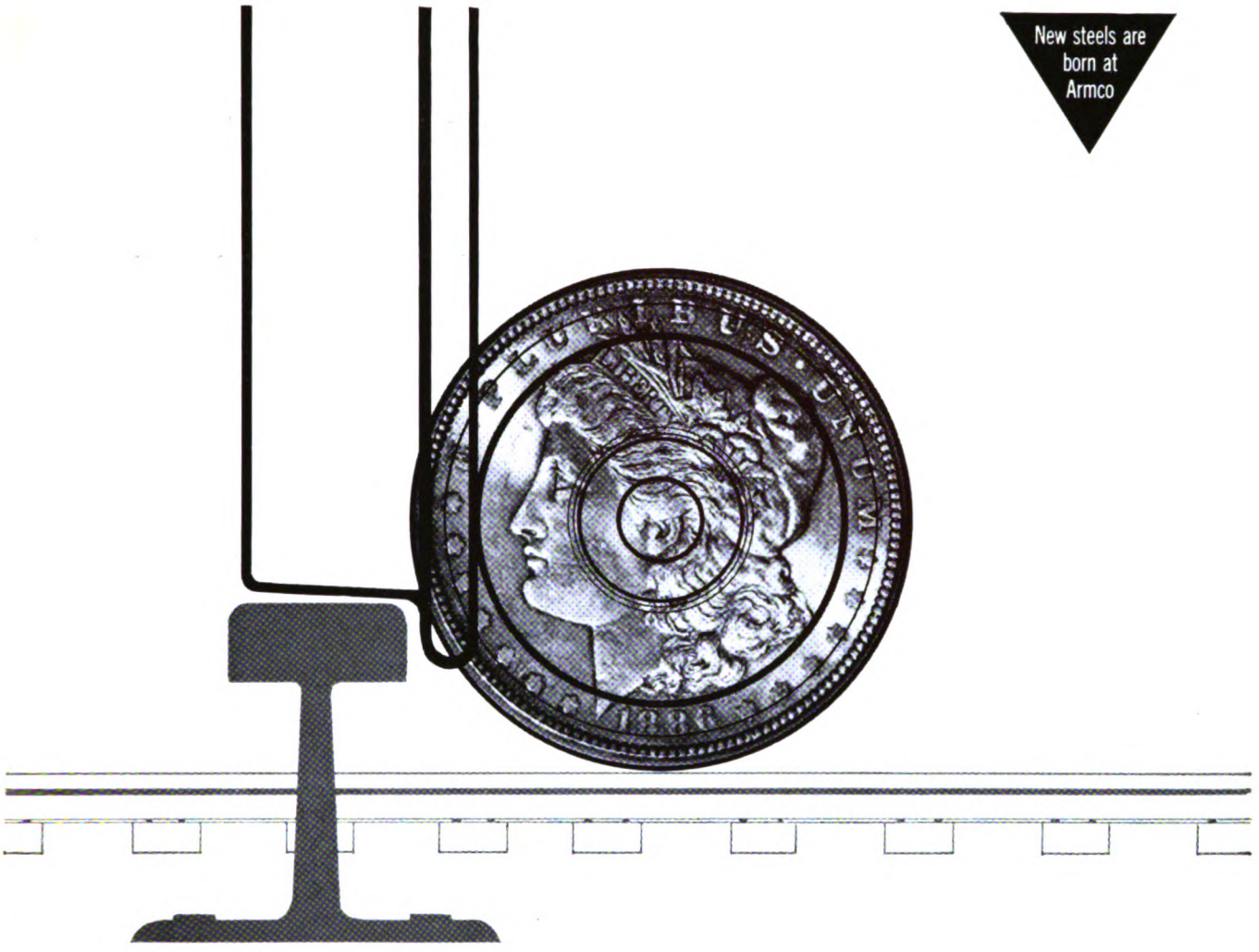
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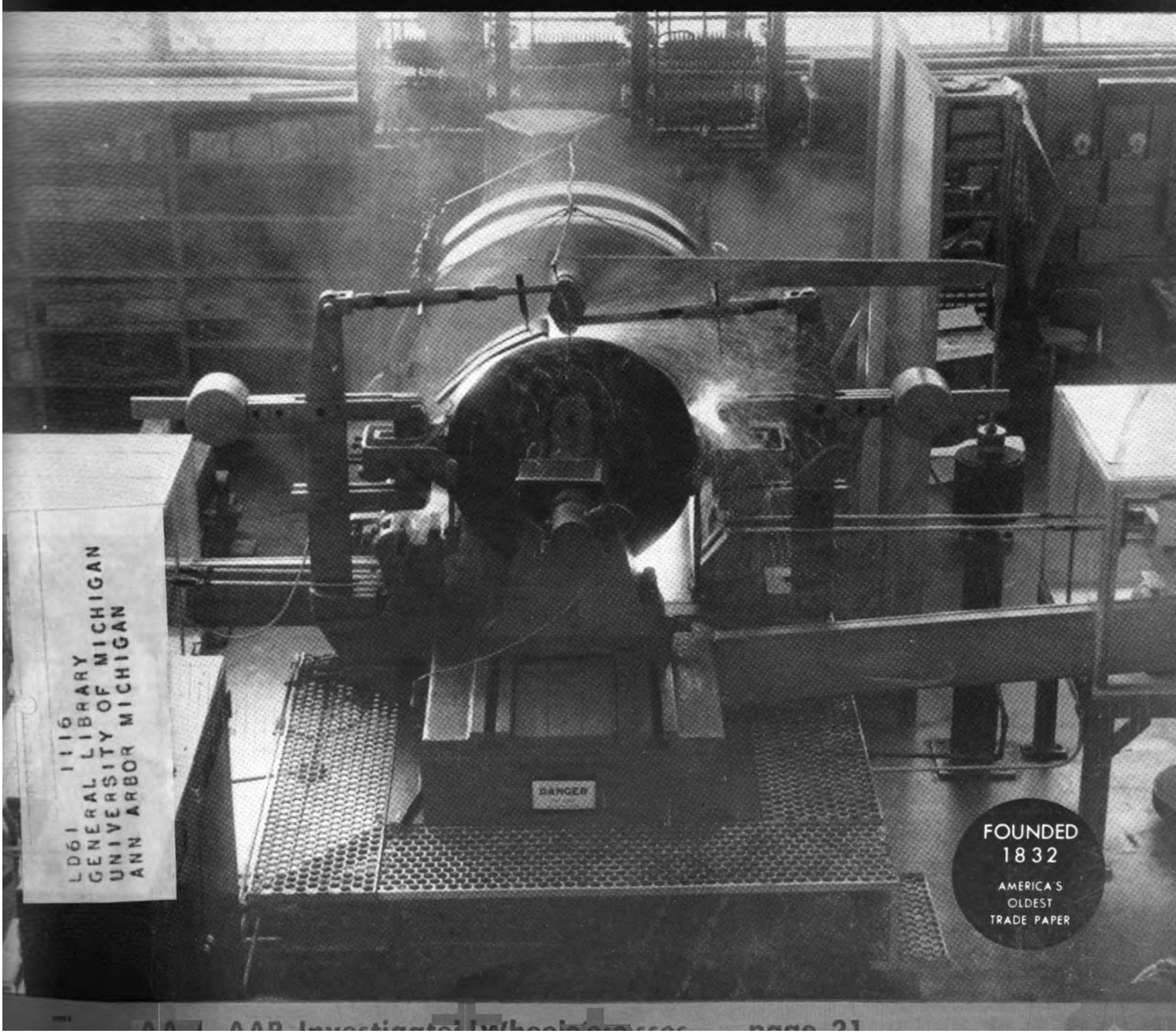
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ICC Locomotive Inspections

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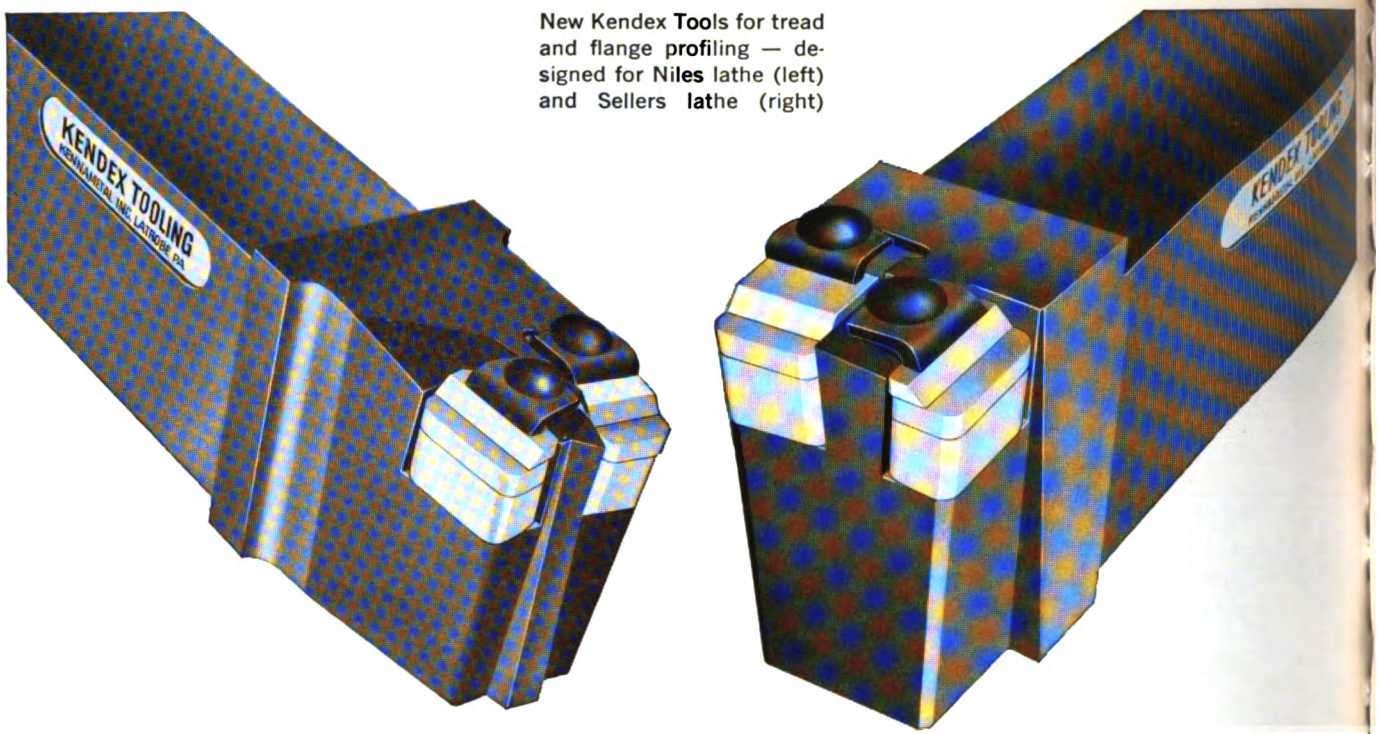
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Operation: Profiling tread and flange 40" diesel wheels on car wheel lathe at 1/16" feed and 7/8" maximum depth of cut

	Conventional Tooling	Kendex Tooling
Number of wheels (basis of comparison)	2710	1973
Wheels per edge	6	8
Time required to change tool	15 min.	5 min.
Cost of carbide only per set of wheels	$.818	$.312
Regrinding cost per set	$.33	Not required†
Carbide plus grinding per set	$1.15	$.312

Operational Data: Car wheel lathe, turning 33", 36" and 40" diameter wheels at 14 to 16 rpm, 1/16" to 3/32" feed, and 5/8" maximum depth of cut

	Kennametal "H" type tooling with Kennametal K21 inserts	New Kendex tooling with Kennametal K21 inserts
Insert cost	$15.13	$4.03
Insert regrinding cost	9.00 (10 regrinds)	NO regrinding†
Total insert cost	$24.13	$4.03
Wheels per cutting edge	6	6
Cutting edges per insert	11 (orig. edge + 10 regrinds)	8†
Wheels per insert	66	48
Insert cost per wheel	$24.13 ÷ 66 = .366	$4.03 ÷ 48 = .084

†Kendex tooling eliminates all regrinding

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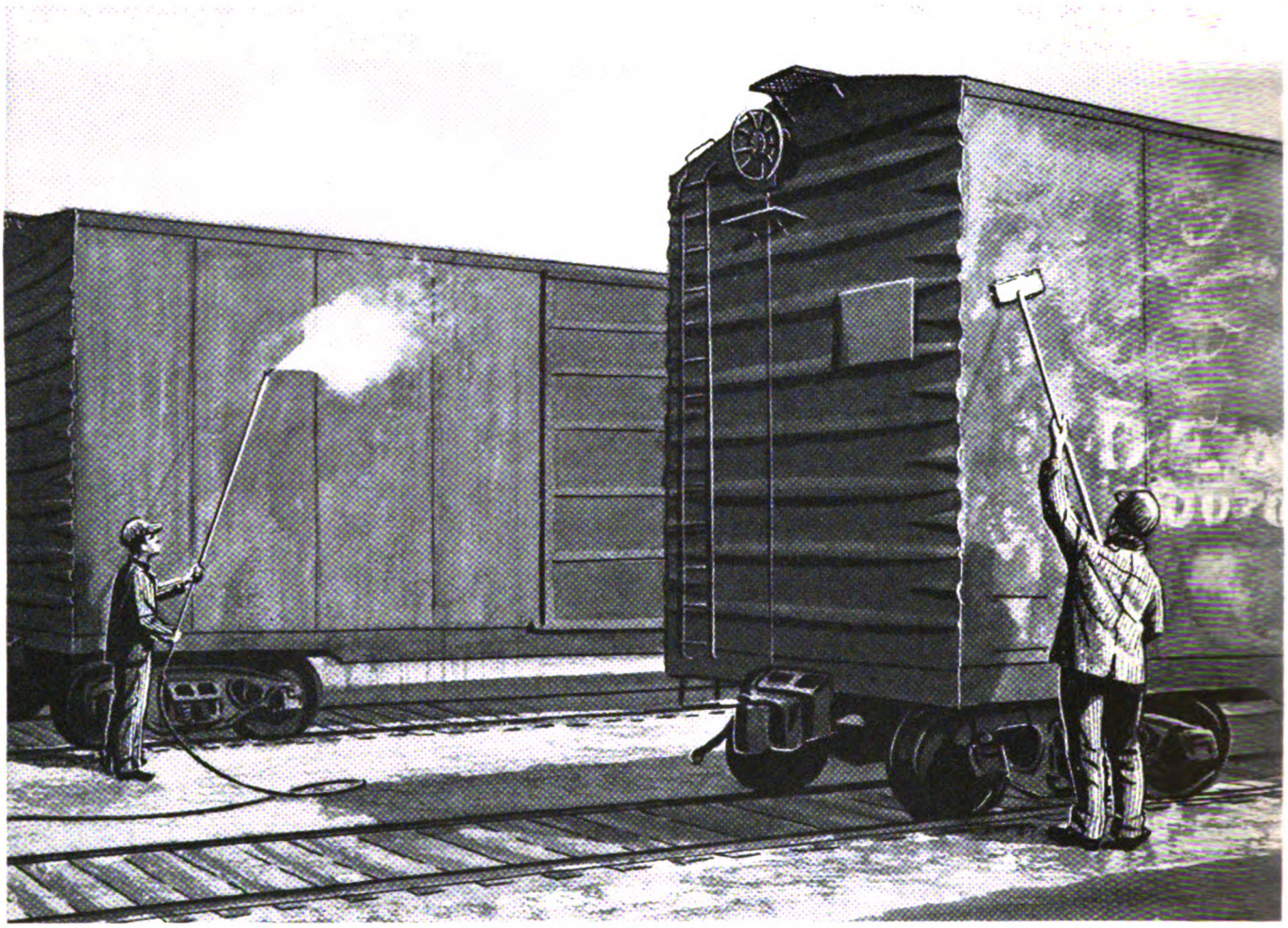
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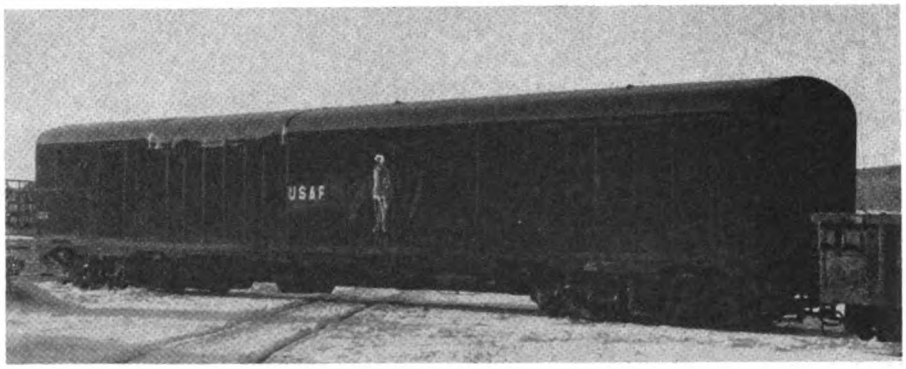
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REPORT FOR MARCH



Missile Launch Car Completed by ACF

First missile launch car, an important component of the Air Force Minuteman weapons system, has been delivered by ACF Industries. The launch car moved from the ACF Berwick, Pa., plant to the Seattle, Wash., plant of Boeing Aircraft Company over the Pennsylvania, Milwaukee, and Union Pacific. At Boeing, it is being fitted with launch gear for the three-stage, solid-fuel missile.

The Minuteman weapons system will consist of missiles deployed in strategically located underground launcher areas and on trains moving at random over the U. S. railroad network. At any given moment, ready "birds" resting in missile cars, will be sitting on railroad sidings, their weapons aimed to strike predetermined targets. Other trains will be on the move, always within minutes of one of the many preselected launching points. The trains will move continuously over various railroads, confusing enemy targeting operations.

The Minuteman system is being developed by the U. S. Air Force under the supervision and direction of the Ballistic Missile Division of the Air Research and Development Command to complement other weapon systems of the Strategic Air Command.

Boeing, weapon system integrator for the three stage, solid-fuel-propelled missile, selected the team of American Machine & Foundry Co. and ACF Industries to jointly design, develop and produce cars from which the missile could be launched, as well as command cars that will be used for control and operations. ACF also is developing the power-car rolling stock for the missile train.

A forerunner of the present car, also produced by the AMF-ACF team, was unveiled last summer (RL&C, Aug. 1960, p 12). Designed strictly for road-test purposes, it formed part of a mock missile train that roamed parts of the United States to confirm the capability of American railroads to support operational requirements.

The missile car has the external characteristics of a baggage car and is equipped with three-way cushioning, according to ACF. It is 88 ft long over couplers, 79 ft 6½ in. over end sills, 10 ft 2 in. wide, 15 ft ¾ in. high, and complies with AAR strength requirements. It rolls on a pair of three-axle, roller-bearing trucks.

Hydraulic shock absorption with a moving center sill gives maximum protection from end impacts. Compressed air returns the cushioning gear to a neutral position relative to the under-frame following an impact. The outside swing-hanger trucks have an air-spring suspension in parallel with standard helical coil springs. Trucks also

(Continued on page 10)

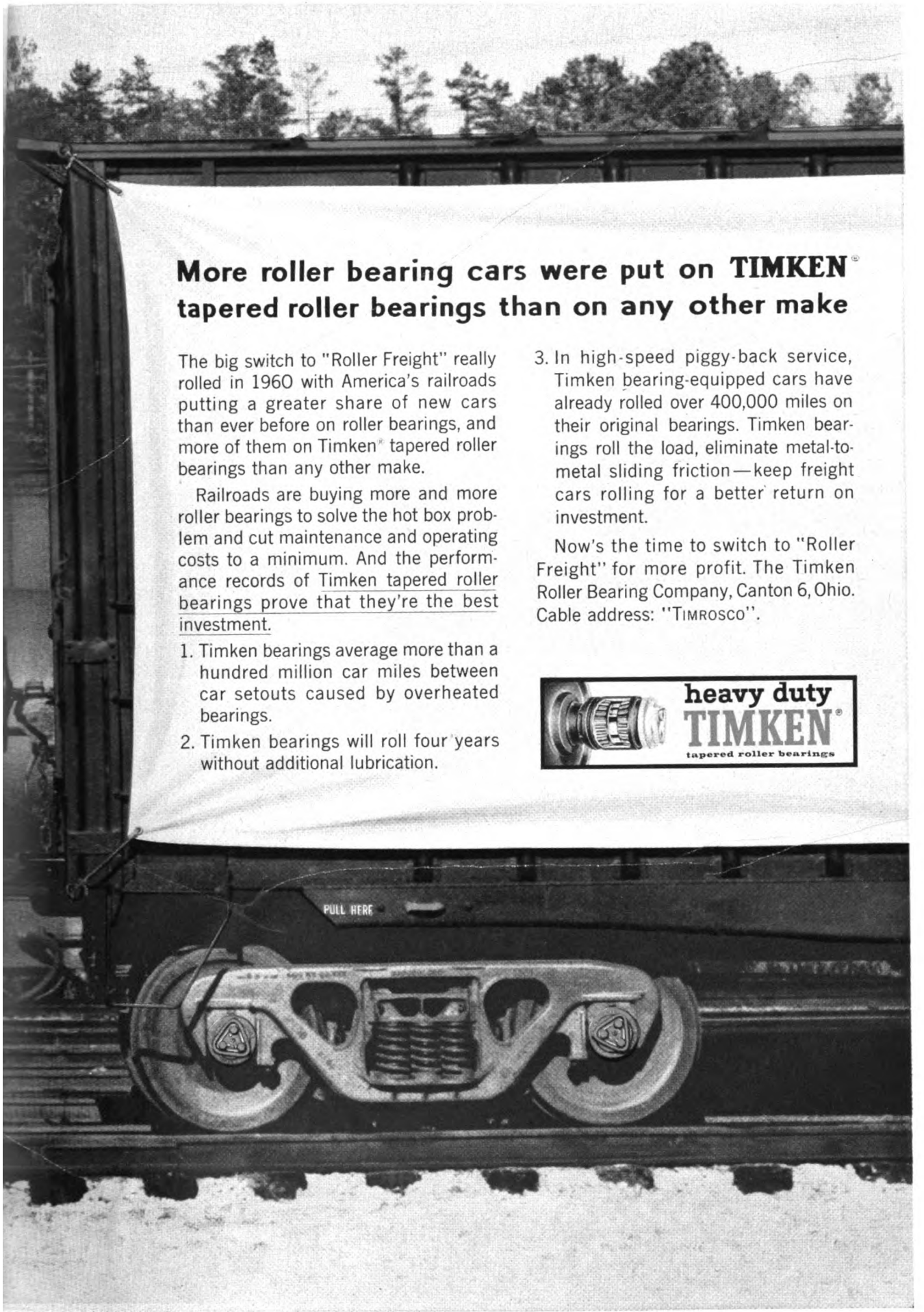
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IN 1960 A GREATER SHARE
OF NEW FREIGHT CARS
THAN EVER BEFORE WENT ON
ROLLER BEARINGS
TIMKEN ROLLER BEARINGS
PULL HERE



More roller bearing cars were put on TIMKEN® tapered roller bearings than on any other make

The big switch to "Roller Freight" really rolled in 1960 with America's railroads putting a greater share of new cars than ever before on roller bearings, and more of them on Timken® tapered roller bearings than any other make.

Railroads are buying more and more roller bearings to solve the hot box problem and cut maintenance and operating costs to a minimum. And the performance records of Timken tapered roller bearings prove that they're the best investment.

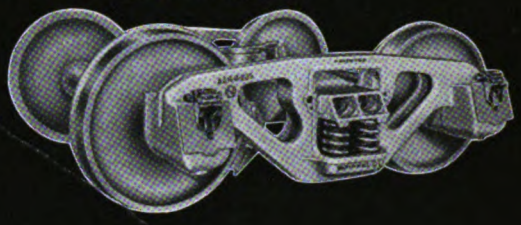
1. Timken bearings average more than a hundred million car miles between car setouts caused by overheated bearings.
2. Timken bearings will roll four years without additional lubrication.
3. In high-speed piggy-back service, Timken bearing-equipped cars have already rolled over 400,000 miles on their original bearings. Timken bearings roll the load, eliminate metal-to-metal sliding friction—keep freight cars rolling for a better return on investment.

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NATIONAL (

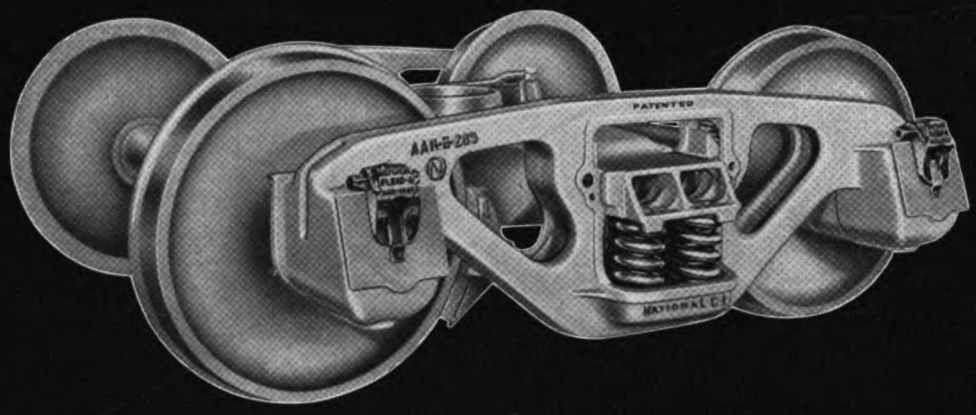
COST LESS THAN 5¢ PER TRUCK FOR ALL PARTS REPLACEMENT IN 12 YEARS' SERVICE

Basic design of the National C-1 Truck has remained unchanged since its introduction over 12 years ago—because the C-1 design was right to begin with and needed no change. Strong claims? For sure. But here's proof of the soundness of C-1 Truck design.

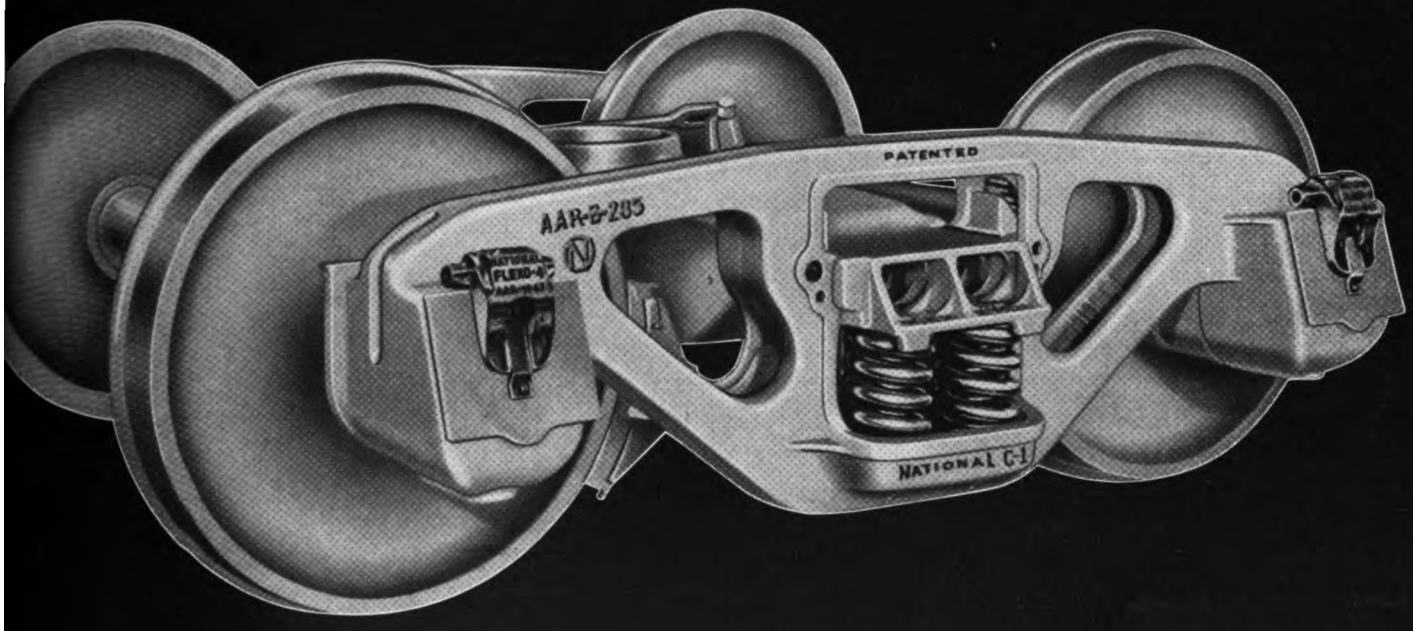
Service parts records show an average replacement rate of only .00129% for wedges, wedge springs and wear plates.

In spite of hundreds of thousands of miles of service, replacement parts costs averaged under 10¢ per carset—less than 5¢ per National C-1 Truck in service.





C-1 TRUCKS



Transportation Products Division

International Division Headquarters
Cleveland 6, Ohio

CANADIAN SUBSIDIARY
National Malleable and Steel Castings Company of Canada, Ltd., Toronto 2B, Ontario

NATIONAL
MALLEABLE AND STEEL
CASTINGS COMPANY
Cleveland 6, Ohio

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COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • JOURNAL BOXES
NATIONAL SPEEDLOADER CONTAINER HANDLING SYSTEM

(Continued from page 5)

are fitted with rotary type shock absorbers. Air springs and leveling valves keep coupler height constant whether or not the more-than-30-ton missile is on board.

The car is designed with 12 jack pads that actually lift it slightly off the rails to provide a stable platform for the missile shoot. Doors built into the arched roof automatically open, permitting the Minuteman to rise into its vertical launch position.

At the time of a shoot, the car would come to a complete stop and a truck-lockout system would be engaged temporarily to lock the trucks to the underframe. Then the 12 jack pads would descend and raise the car into its final launch position. Connected to those jacks nearest the actual launch pad at one end of the car is a 10-ft square steel flame deflector that lowers over the ties and rails and protects them from the missile blast. The launch area door then slides toward the end of the car, leaving an opening directly over the launch pad. The main roof doors, each 45 ft long and half the width of the car, open and the missile is raised to its launch position on the pad.

Long-Cushion Effective, P-S Impact Tests Show

Desirability of using the 20-in. cushion instead of the 10-in. model under auto racks on three-deck auto transport cars is "self evident," according to Pullman-Standard. Tests were made recently at the Pullman Research and Development Center in Hammond, Inc. (RL&C, Feb. 1961, p 42).

Forces and stresses were greatly reduced on the Lo-Dek car fitted with Dana three-level racks when the 20-in. cushion replaced the standard 10-in. type. While the long travel arrangement has not received ICC approval, the car's deck can accommodate either type.

Fully loaded tri-level car can carry 12 standard autos or 15 compacts. Results on a fully loaded Lo-Dek showed efficiency of 20-in. cushions:

	8 mph	10 mph
10-in. cushion:		
Coupler force, lb.	574,000	880,000
Cushion force, lb.	132,800	173,900
Rack travel, in.	10⅝	10¾
Acceleration (G)	1.63	2.18
20-in. cushion:		
Coupler force, lb.	550,000	902,000
Cushion force, lb.	93,700	133,200
Rack travel, in.	17⅝	19¾
Acceleration (G)	1.2	1.53

CTA Building Rapid Transit Shop

The Chicago Transit Authority has awarded a $969,900 contract for building a rapid transit service and inspection shop at the Desplaines Avenue terminal in Forest Park, Ill. The new building, scheduled for completion about May 1962, will cover an area of 26,000 sq ft, and provide maintenance and inspection facilities for rapid transit cars operating on the Congress, Douglas and Milwaukee routes.

The shop will accommodate 12 cars at a time and is to be arranged so that service, maintenance and repairs can be performed on a production line basis. Overhead cranes and monorails will be provided. Cars to be serviced will be run over a pit for cleaning before entering the building. Inside, the cars will be on elevated tracks above the working floor. A new arrangement has been developed so that each truck can be raised from the track for inspection and run at full speed if necessary for testing.

A hoist will be installed which will raise two cars together 5 ft above the normal track level. From this position any one or all trucks can be lowered for removal and replacement. New trucks would be rolled into position over electric turntables. The entire mechanism will be controlled by push-buttons and provided with safety devices.

Other facilities will include storage areas for repair parts, an upholstery shop, and an automatic car washer. Tracks to store 100 cars during off-peak periods will be provided.

ASME-AIEE Railroad Conference Cancelled

The Railroad Conference to have been sponsored by the Railroad Division of the ASME and the Land Transportation Committee of the AIEE April 20 and 21 has been cancelled. This conference, to have been held at the Sir Francis Drake Hotel, San Francisco, would have been the fourth such meeting of the two groups. Previous conferences were held at Cleveland, Chicago, and Pittsburgh.

Electrical Developments Discussed by AIEE

Automation, electrification, and improved diesel-electric locomotives — all developments which can do much to change railway operation and maintenance practices — were topics of the recent Winter General Meeting of the American Institute of Electrical Engineers in New York. New methods and materials were discussed during the three-day session of the AIEE Land Transportation Committee.

"The railroad is an appealing subject for automatic control," R. C. Buck of General Railway Signal Company reported. "With present centralized traffic control and signaling systems, the train's route can be determined from a central office, and information as to maximum permissible speed generated at or brought to the wayside. Coded cab signaling can be used to transmit these commands to the train through the rails.

"What remains is to build a device to make the decisions and take the actions of the engineman. One could build a device he thought would do the job, install it in a locomotive of a willing railroad; try it, and modify it, until an acceptable model was produced. As an alternative, if an artificial train could be built in the laboratory which simulated the responses of a real train closely enough, individual ideas as well as the complete device could be tried on the simulated train at a considerable saving in development time and expense.

"It has been found that the analog computer can be used to simulate a railroad train accurately enough so that details of operation may be studied. Because railway car rolling characteristsics vary widely depending upon lubrication, temperature humidity and rail condition, extremely accurate predictions of a train's performance cannot be made. It cannot even be matched empirically because the train will perform differently each day. Useful results can be obtained for the evaluation of different types of throttle handling and of controls, which sense acceleration, and similar conditions.

"Work is being done to improve the accuracy of this simulation by taking into account slack action, train length, dynamic braking, and variation of brake-shoe-to-wheel friction coefficients at different speeds."

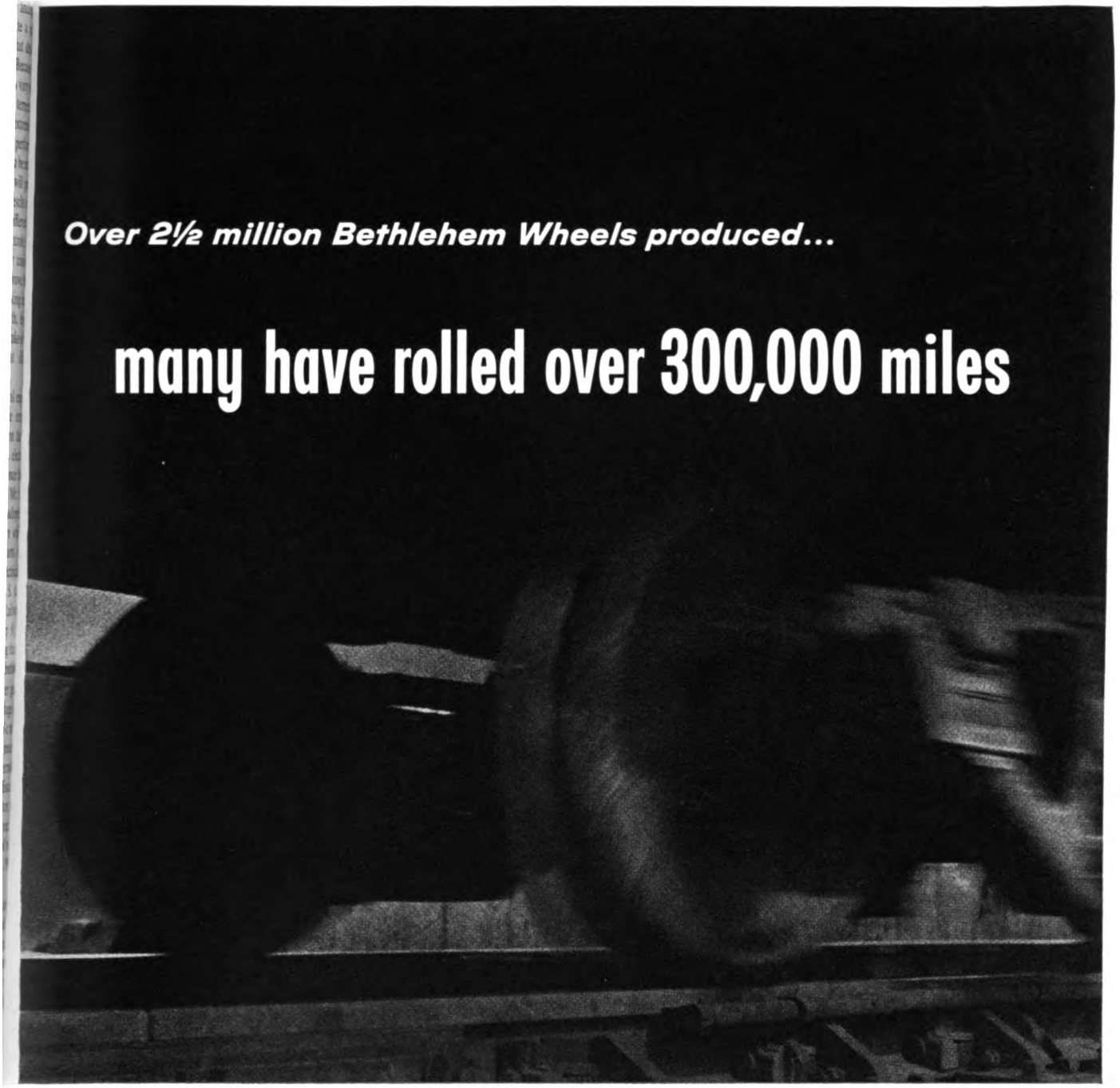
S. W. Smith, assistant electrical engineer, Pennsylvania, reported on the extensive electrification now in progress on the British Railways. All phases of this electrification were discussed at a conference held in London in October 1960 which Mr. Smith attended. British Railways have adopted the 25,000-volt, 50-cycle, a-c system which is increasingly popular in many parts of the world. J. W. Horine, PRR electrical engineer and a member of the U. S. delegation which inspected the Soviet Railways in July (RL&C, September 1960, p 9), told about Russian electrifications using the same commercial frequency a-c distribution.

"Economic advantages of power generation and distribution as high voltage alternating current and advantages of d-c motors for traction demand economical means of rectification," E. J. Diebold, International Rectifier Corporation, stated in discussing the developments in semi-conductor rectifiers. The mercury arc tank type rectifiers have been applied on several types of rolling stock in the U. S. (RL&C, Dec. 1960, p 50).

"Semi-conductor rectifiers have many advantages for this purpose, such as small size, high efficiency, wide temperature range, and high mechanical strength," Mr. Diebold concluded. "Semi-conductor rectifier cells for railroad use presently are made almost entirely from monocrystalline silicon. This is an extremely pure semi-metallic substance obtained from common silica. Inherently the material is a very poor electrical conductor, but only a few parts per billion of impurities make it conductive. Some impurities supply positive, some negative conductance. In a thin wafer of single crystal silicon, with positive impurities on one face and negative impurities on the other penetrating the wafer until they almost meet, electric current flows easily from positive to negative, but cannot flow in the reverse direction.

"Presently available semi-conductor power rectifiers are not yet ideal for railroad service, because of limited overload capacity, insufficient intermittent load life, sensitivity to voltage transients, and uncertain reliability. Advantageously, however, they are small size, solid, hermetic and easy to mount; insensitive to motion or position; insensitive to a wide range of ambient and operating temperatures. They are natural rectifiers, requiring no auxiliaries, no maintenance. Their circuitry is simple and flex-

(Continued on page 41)



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EDITORIALS

Container Interest Grows

Containers have been developed and used for many years in rail shipments of special products. Yet the acceptance of containers has been slow; the general purpose box car has continued to be the workhorse of the car fleet. Recently, however, there has been a growing interest in the use of containers and their cost-saving and traffic-getting potential in an integrated transportation and materials-handling concept.

In recent weeks the upward trend in containerization was spotlighted on two occasions. One was a speech by John D. Loftis, director of marketing, American Car and Foundry Division, ACF Industries, at a Northwestern University conference on technological change and the future of the railroads. The other was a report on "An Economic Study of Containerization and Its Markets" released by the Reynolds Metals Co.

In his speech Mr. Loftis said "the greatest cost-reducing technological breakthrough of all, ironically, has not as yet been adequately recognized; that is, the separation of the rolling structure of railroad cars from the containing structure—piggyback and containerization." Separation of containing and rolling structures, he said, permits each form of land and water transportation to perform the part for which it is best suited without costly delays of transferring from one to the other.

In the Reynolds report, prepared by H. E. Holmes, seven advantages and four "major difficulties" were set forth. The advantages that may be found in containers are: lower freight rates, lower handling costs, lower in-transit insurance costs, reduced damage, reduction or elimination of pilferage, improved distribution patterns and reduction of warehousing problems.

First of the difficulties is standardization. Mr. Holmes believed establishment of a "family" of container sizes, handling mechanisms, and appurtenances compatible to all modes of transportation is a possibility by 1965. Second, labor requirements are reduced. Like any application of "automation," he said, this difficulty is a short-range displacement of labor and the problem becomes one of cushioning the effects upon labor.

Cost is the third difficulty. Evolutionary progress toward well-designed, well-built and competitively priced units will take time. Last, there is the problem of coordination. Some degree of cooperation and equitable distribution of cost savings among the different carriers is needed.

What does this trend toward containerization mean to the mechanical department? It could have an important influence on the kind of cars that may be needed. And the probability that container car traffic must be moved at high speed is another reason why high-horsepower motive power should be acquired.

Piggybacking caught many railroads napping with the result that hundreds of standard flat cars, cars not designed for the service, had to be converted as an expedient. Mechanical department officers should keep ahead of this containerization development and be prepared to meet any demands it may place on their rolling stock.

Filling a Void

New developments with railroad applications occur so rapidly that the average railroad man can do little more than keep abreast of them. Railroad associations do much to record and appraise the value of new things. But it is regrettable that associations fostered by the railroads need curtail their work because of economy measures. It is also notable that at least one other association is increasing its functions for the benefit of railroads.

This is the Land Transportation Committee of the American Institute of Electrical Engineers. At its last meeting held in New York, Jan. 31-Feb. 2, it produced papers to indicate much progress in the field of railroad transportation. For example, one showed that signals to control locomotive operation can be transmitted over tracks and that by means of an analog computer such signals may cause the locomotive to operate over a varying profile as if controlled by an engineman. Another showed how the several manufacturers of the highly effective epoxy resins can produce any required type of resin to match the needs of railroad service. Still another showed how it is possible to make up a package study to predetermine, with some degree of accuracy, the advantage a railroad might obtain by the use of electric traction. A diesel-electric locomotive with minimum gadgetry was described which was designed with a slogan, "If it isn't on there, it can't fail" in mind.

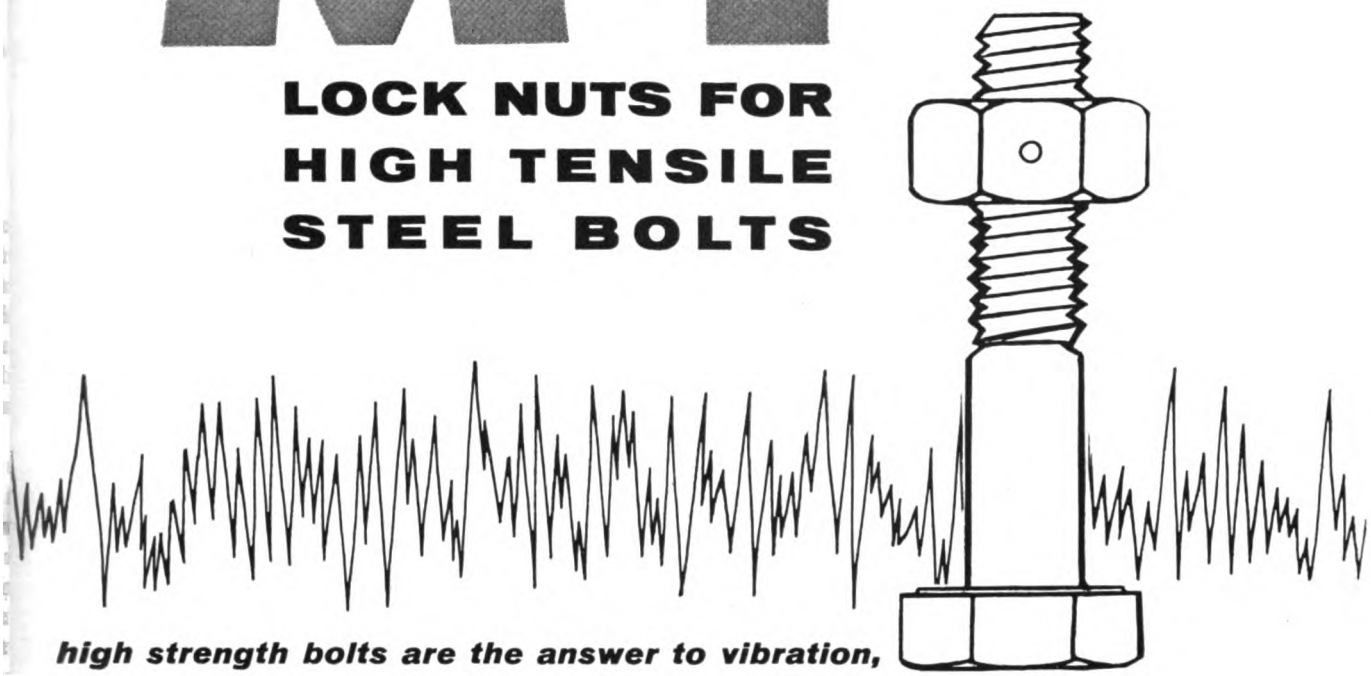
Among several contributions from foreign countries was one describing the use of a single traction motor, geared to both axles of a two-axle truck on a car or locomotive. This practice, it is claimed, will increase adhesion 50 per cent as compared with a similar truck having its axles driven separately by two motors. Several foreign countries employ silicon-type rectifiers to replace mercury-arc rectifiers on cars and locomotives. These are desirable because of their small size and simplicity, but are looked upon skeptically because of possible failure which may be caused by over voltage or current peaks. Listeners were assured that these difficulties may be overcome in rather simple fashion and an American railroad has declared its intention to use them.

It was one of the largest meetings this committee ever held and it included more than the usual percentage of railroad men. The significance of the situation appears to be that in a free economy (and we sincerely hope that ours is indeed free) a vacuum is always filled. When a need is created arbitrarily or by circumstance—someone or something always takes care of it.

The AIEE Land Transportation Committee can not function as an official railroad organization but it can probably do better with subjects concerning design and manufacture and with some forms of practice.

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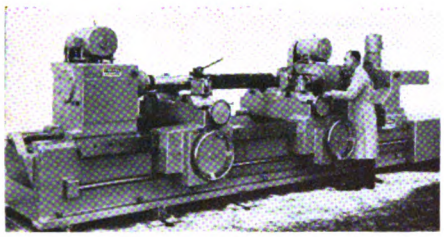
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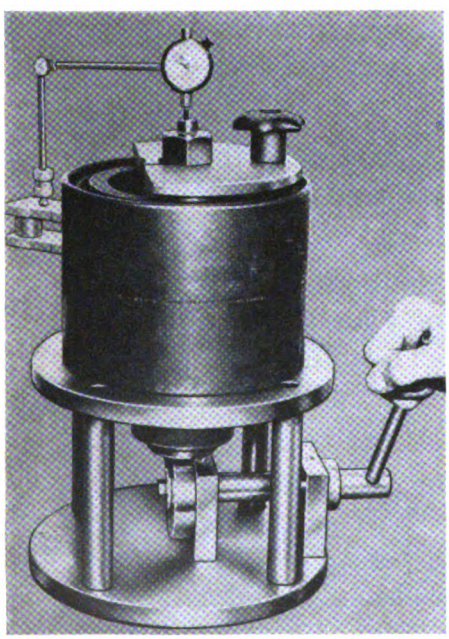
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Journal Truing and Axle Lathe

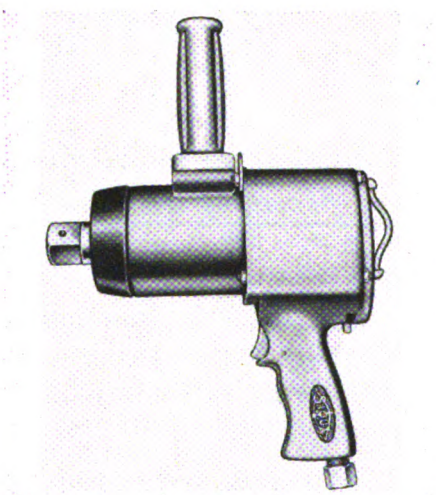
The Farrel-Sellers dual end-drive lathe will rough turn, finish turn, and burnish either new or used car or diesel axles in standard AAR sizes from 3¼ in. x 7 in. up to and including 6½ in. x 12 in. It will turn and burnish inside journals of mounted wheel sets with tread diameters up to 46 in., and turn center portion, between wheel seats, of either straight or tapered axles.

The lathe has a swing of 49 in. over the 17-ft 8-in. bed. Swing accommodates a wheel tread diameter of 46 in. Center height is 46¾ in. from floor line. *Farrel-Birmingham Co., Consolidated Machine Tool Div., Dept. RLC, 565 Blossom Road, Rochester 10, N. Y.*



Lateral Checking Fixture

A set of OTC tools, designed in cooperation with the Timken Roller Bearing Co. and approved by them and the Hyatt Bearing Div., General Motors Corp., determines the correct bearing bench lateral play and permits proper lubrication of freight-car roller-bearing assemblies. The tools are used after bearing assembly has been completely disassembled, degreased, and necessary maintenance performed or parts replaced. As reassembly begins, the Lateral Checking Fixture determines the correct amount of bearing bench lateral play which will allow corrective action to be taken if the lateral play is not within the limits specified. One bearing cone is then greased with the Bearing Cone Greaser and inserted into the outer bearing cup. Next, the cone spacer is inserted into the outer bearing cup and lubricated with the Cone Space Lubricator. Finally, remaining bearing cone is greased wtih Bearing Cone Greaser and inserted into the outer bearing cup. *Owatonna Tool Co., Dept. RLC, 679 Cedar st., Owatonna, Minn.*



Air Impact Wrench

The Sioux heavy duty 1-in. square drive No. 482 air impact wrench features a new and improved air motor and housing. Air entry is through a ½-in. inlet. With more air moving at higher speeds, the wrench accelerates rapidly for faster rundown. The reversing valve with related volume control for right-hand operation is leakproof, and bails provide for horizontal or vertical suspension. An auxiliary, adjustable handle can be moved to four positions. *Albertson & Co., Dept. RLC, Sioux City 2, Iowa.*

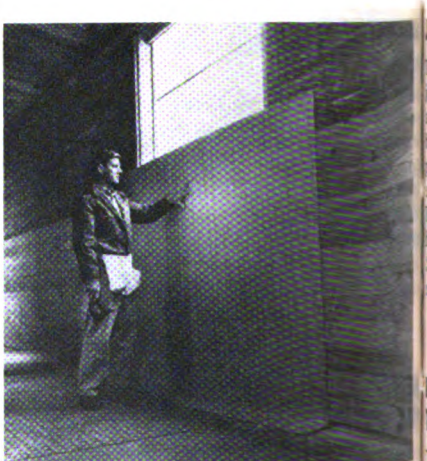
Journal-Box Lid

Journal-box lids, Types 170 and 171, of heavy-gage pressed steel, with easily replaced seals, have a constant pressure compression spring which provides maximum seating surface and range of deflection on the journal-box housing. The lids have four-way articulation, an extended housing arm to facilitate raising, and a 120-deg opening for installation and service. Seals



of neoprene closed-cell rubber skin are held tightly against the lids by a solid stamped retainer plate fastened at two points by standard bolts, lock washers and nuts. In combination with the 40 to 65 lb per sq in. lid pressure, a complete seal is formed with the face of the journal box, keeping moisture and dirt out and oil in, and eliminating vibration and shock.

One road has over 1,500 70-ton hopper cars equipped with the lid which has been certified by the AAR. Type 170 (Part No. 3372) fits both 5- x 9-in. and 5½- x 10-in. boxes. Type 171 (Part No. 3354) fits 6-x 11-in. boxes. *Motor Wheel Corp., Dept. RLC, Lansing, Mich.*



Grain Door

Six- to 9-ft doorways, it is said, can be covered with a new grain door without special harness or extension bands. The door center post is reinforced by a tension cable which connects grain doors on each side of the car. This minimizes bulging and blocking of storm doors and permits easy inspection. Coopering can be completed in half the time required by other types of doors and with fewer hazards because of steel straps. Regular roofing nails pinion the door to the side walls.

Although the door can be cut for unding, reinforcing glass scrim in the heavy ift paper prevents the spreading of small its or tears occurring in transit. Accord- to the manufacturer, cars can be pped for reloading in 5 min without cial tools.

For 3½ years the door was tested on g hauls, often with over 110,000 lb of in. During the tests, grain loss due to lure of the door was said to be less than . *Bemis Bro. Bag Co., Dept. RLC, 408 e st., St. Louis 2, Mo.*

raphite Lubricant

exacote is a quick-drying lubricant comunded from a blend of fine Mexican aphite and special oils. It is non-toxic and s been specially formulated for use on rings, buffer assemblies, center plates, destal jaws, and liners. When thinned th turpentine, naptha, or oelum spirits, lubricant is easily applied by brush, ab, or spatula. It is packaged in 1-gal ns. *United States Graphite Co., Div. of ickes Corp., Dept. RLC, Saginal, Mich.*



ournal Jack

he Speedmatic air-operated empty car urnal jack is balanced for easy movement nd designed for application and removal of earings and lubricators. It can be used on aved or unpaved repair tracks and placed nder the journal box at any desired angle. he manufacturer claims it reduces present and jacking labor costs 50%. *Western tates Supply Co., Dept. RLC, 1517 Harney t., Omaha 2.*

ngine-Water emperature Regulator

he 1012-EMD engine-water temperature egulator, for application to 1,000 - 1,200-hp MD switchers is self actuated, requiring no ir or electric power. Because of moduating control, wide variations in water temerature are prevented. Its light weight requires no bracing, and less than 8 manours, it is said, are needed to replace the xisting cast tee.

The regulator, installed in the space vacated by the cast tee, will vary the flow of water through the radiator from zero to maximum. Water below 160 deg all flows o the bypass. Above 180 deg, all flow is o the radiator. Between 160 and 180 deg, here are many variations of flow through



the radiator. Water temperature, therefore, is seldom below 160 and never above 180 deg. Shutter control is adjusted to open at 175 deg. F. *Ogontz Controls Co., Dept RLC, 8029 York Road, Philadelphia 17, Pa.*

Low Temperature Insulation

Cellofoam low-temperature insulation is a closed-cell, rigid, expanded polystyrene product having a density of 1.0-2.0 lb per cu ft. It is available in regular and self-extinguishing forms. Maximum length is 12 ft 4 in.; widths, 12, 16 and 24 in., and thicknesses, ½ through 8 in. Tested at a mean temperature of 40 deg F, the insulation is said to have provided a thermal conductivity (k) value of 0.22 Btu per hr per sq ft per in. per deg F. It is said to possess high bond strength for finishing applications and to have excellent resistance to impact and compression loads. It may be applied to wood and steel surfaces subject to operating temperatures as low as minus 60 deg F. *United States Mineral Wool Co., Dept. RLC, Stanhope, N. J.*

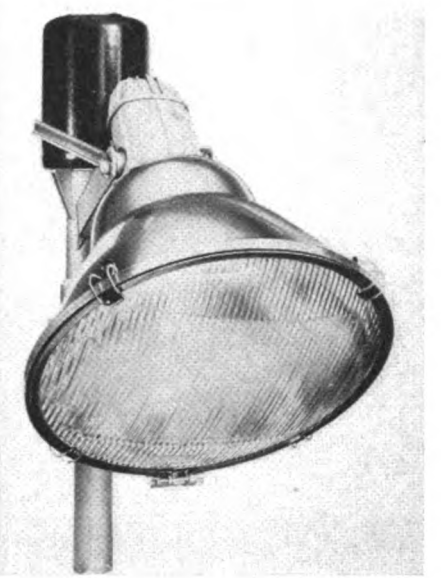


Outdoor Vacuum

The Blow-Vac outdoor vacuum Model Y-3 is specially designed for picking up waste paper and other refuse. Its front wheels, mounted on nozzle for easier operation especially on uneven ground, adjust to three positions. The semi-pneumatic rubber tires on the rear wheels are 10 in. diameter. The 30-in. x 4-in. nozzle is welded directly to impeller housing. Power is furnished by a 3-hp, 4-cycle Briggs & Stratton gasoline engine, and speed is controlled from the handle bar. Fuel tank holds ¾ gal. *Outdoor Vacuum Div., Wheel Truing Brake Shoe Co., Dept. RLC, 628 W. Baltimore ave., Detroit 2, Mich.*

Rust Remover

Alkaline rust remover is a non-acid, non-flammable product that removes heavy rust and stubborn paint deposits by means of a one-tank operation followed by a pressure rinse. It contains no cyanide compounds and is said to emit no corrosive fumes. When used in a soak tank or electrolytically, the remover requires a welded, mild-steel hot tank with stainless-steel heating coils. Metals withdrawn from the process require no after-neutralization. *Turco Products, Inc., Dept. RLC, 24600 South Main st., Wilmington, Calif.*



Mercury Vapor Floodlights

The Spreadliter, a wide-beam mercury vapor floodlight, features uniform distribution without hot spots; full 18-in. parabolic Anadol finished aluminum reflectors which avoid trapped light, and fin-cooled aluminum socket housing. No tools are required for cleaning and lamp changing. Combination pole top floodlights with ballast are available as a complete package, and floodlights for remote ballast mounting are available in wall, crossarm, pipe clamp, and pole top types.

Color corrected 1,000 lamp types with ribbed lens have beam spreads of 164 deg horizontal, 120 deg vertical. Clear lens types have a 96-deg circular beam pattern. Types of 400 watt with ribbed lens have beam spreads of 163 deg horizontal, 101 deg vertical. Clear lens types have an 89 deg circular beam pattern. All types are especially adapted for railroad yards, loading docks, etc. *Steber Div., Pyle-National Co., Dept. RLC, 1334 N. Kostner ave., Chicago 51.*

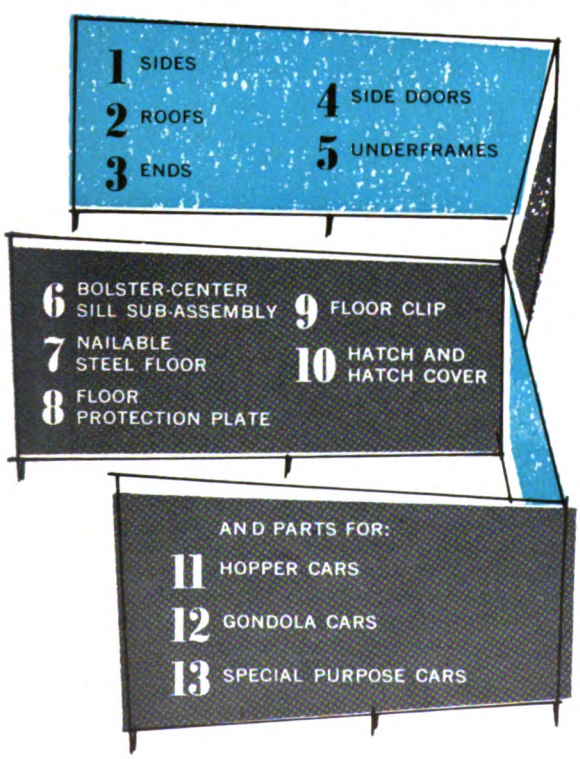
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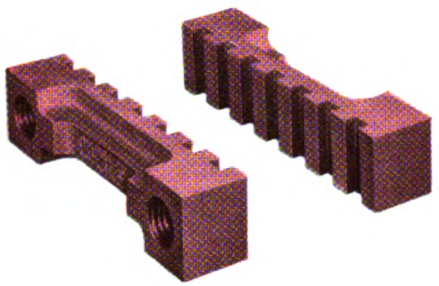

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AND PARTS FOR:
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GALLERY

STABILIZED JOURNALS—

Now MAGNUS offers you three low-cost ways to get

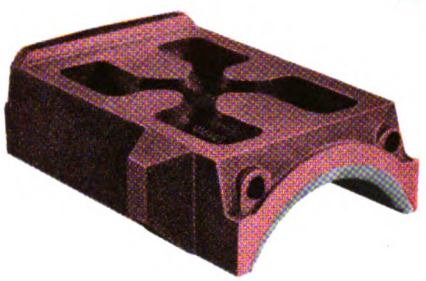
BETTER BEARING PERFORMANCE



1. MAGNUS R-S JOURNAL STOPS

Provide maximum stabilization of entire journal box assembly—increases miles per hot box ten times

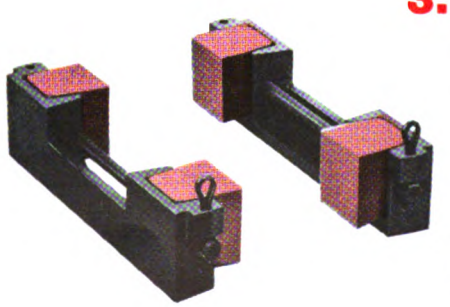
Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures—increase miles per hot box *ten times;* miles per cut journal, *fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.



2. MAGNUS FLAT-BACK SOLID BEARINGS

Wider, non-tilting design limits bearing displacement—provides effective stabilization at lower cost

The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust-guard, reduces loss of oil through enlarged dust-guard openings and tends to prevent spread linings in the bearing.



3. MAGSTOPS

Offer the inherent advantages of R-S Journal Stops in a low-cost, rugged, fabricated design

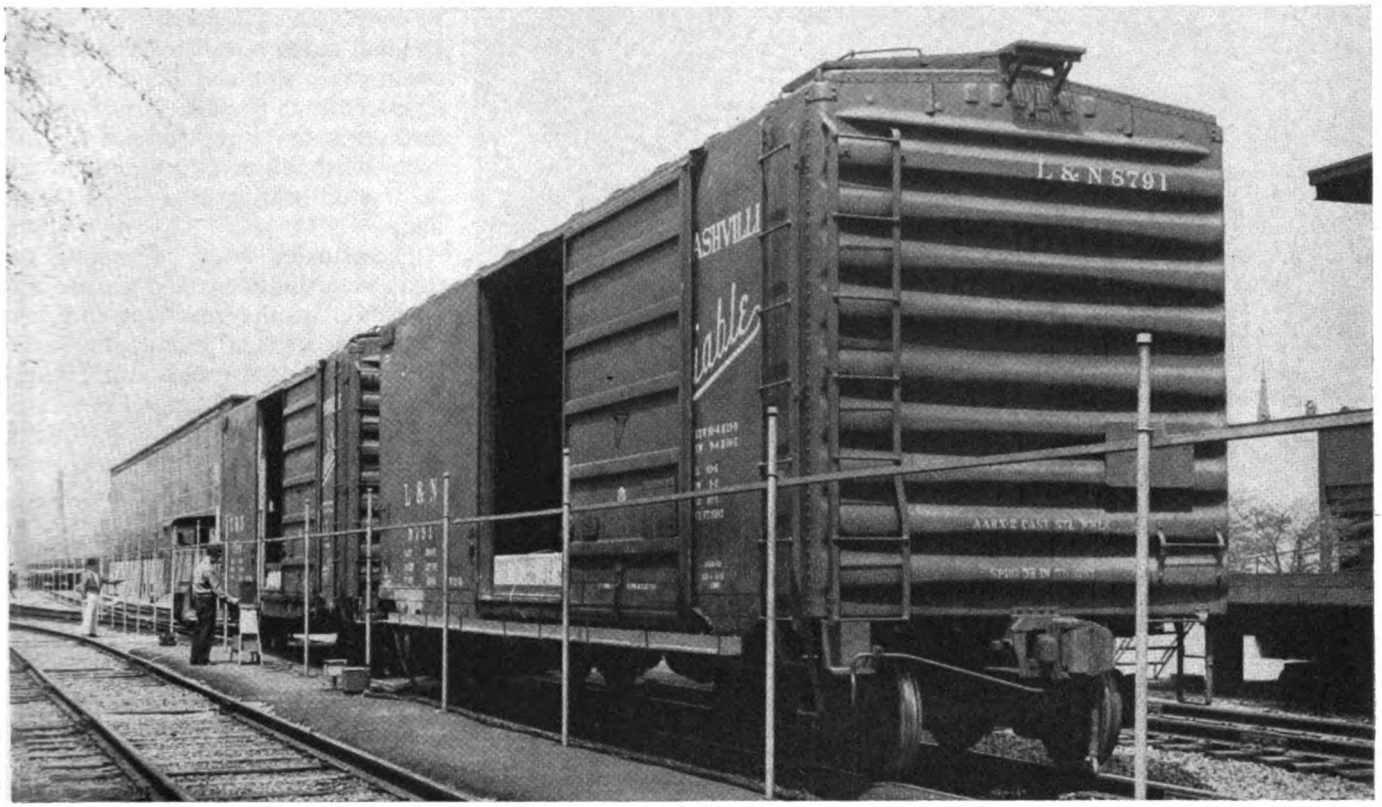
Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The next big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

MAGNUS METAL CORPORATION

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Cars are operated on this test track in the course of impact experiments which are determining the effectiveness of draft gears.

AAR Research Studies Draft Gears

Cushion underframes, wheels, and journal lubrication are also under investigation for Mechanical Division

Draft-gear investigations have recently been an important phase of AAR Mechanical Division research. This research is carried on at the AAR Research Center in Chicago. Wheel and axle investigations are among the other activities which were important assignments of the Research Center technical staff last year.

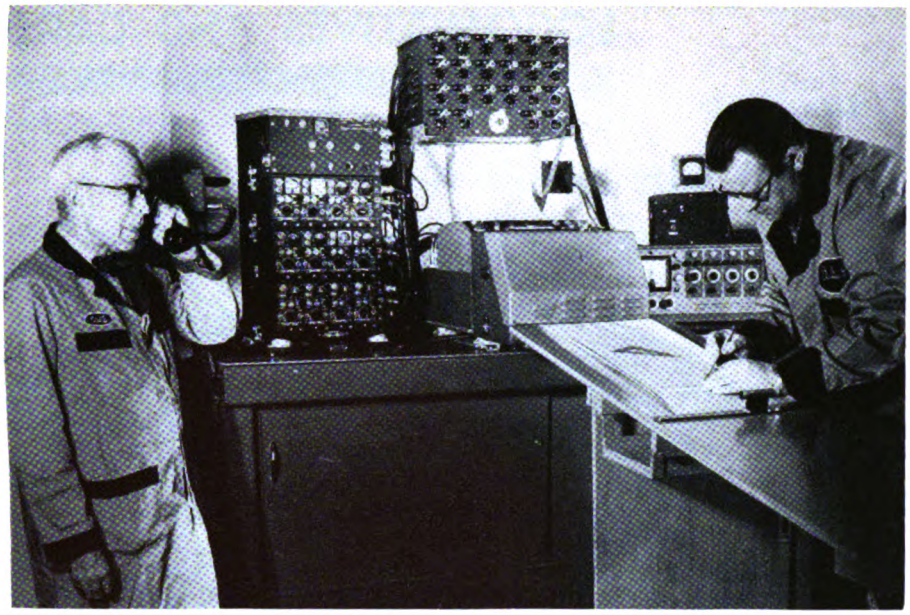
The Research staff is currently making a complete review of sliding center sills. It is planned to set up standards to control the installation and maintenance of the various types now in interchange.

Extensive tests have been made on the standard-pocket draft gears to determine the actual performance of eleven types under controlled impacts. Included were two rubber-friction type gears, one high-capacity friction type, three rubber gears, and five standard friction gears. Stresses developed at critical points in the underframe and body bolsters and during impact were measured with SR-4 strain gages. Forces in the dynamometer couplers and measurements of gear closure were obtained electronically.

A special electronic gage mounted on the draft-gear carrier iron at the lower center of the draft-gear pocket was used to record gear travel in relation to peak forces. In addition, a mechanical travel gage, mounted parallel with the electronic gage, measures maximum gear travel to 0.01 in.

A new instrumentation system for measuring draft-gear reaction forces has been installed in the Research Center testing machine used for draft-gear tests. The recording oscillograph delivers complete record within seconds following measurement of the force by a load cell transducer. Recently revised AAR draft-gear specifications M-901-D and M-901-E make reaction forces a governing factor. Draft-gear capacity is now established at a point where a 500,000-lb reaction force is obtained.

An additional requirement of the new specifications is successful completion of actual service tests before final approval is granted. After two years of road service, gears are inspected at the Research Center and



Oscillograph for recording draft gear impacts on outdoor test track is located in an instrument room and is controlled remotely from the test track site.

subjected to capacity tests for comparison with original performance.

During the past year over 100 gears were installed in 70-ton hoppers, refrigerator cars, high-capacity box cars, new tank cars, and covered hoppers as part of these AAR check test requirements. Twenty-three car sets of gears were removed from service as part of the inspection program. Two gears have been given unconditional approval. An additional 100 gears await completion of AAR approval tests for actual service installations.

Friction gears removed in the service check test program are being investigated to determine if rusting causes loss of capacity. New gears were calibrated and placed in a humidity chamber where rust was induced with live steam. Appreciable loss in capacity is found when a heavy coating of rust occurs after the gears are shipped and before the friction plate wears in and cleans the rusted area.

Excessive wear of F-type interlocking freight-car couplers is under study by the AAR Coupler and Draft Gear Committee. Jackknifing of the coupler at the rear ball and socket joint can cause the rear of the yoke and the gear carrier to wear and deflect excessively. A new supporting arrangement, including a second support plate, may correct this condition.

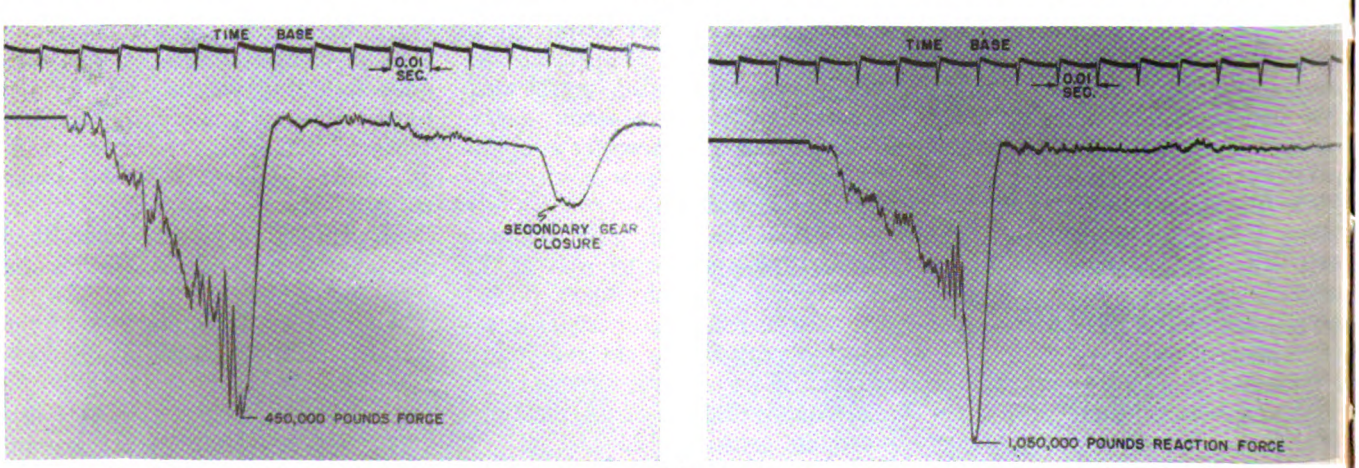
Studies being made on the raised wheel seat "as-forged" body freight-car axles and journal area of roller-bearing axles have been accelerated, with the full scale fatigue machines operating on a 24-hr basis. An enlarged program of strain gage and fatigue testing of diesel locomotive axles was started in 1960. In addition to the three diesel axles already tested, twelve additional axles are under test. Along with the rotating fatigue tests, static strain gage tests were made both when the mounting wheel was pressed on and when the static bending load was first applied in the fatigue machine.

Experiments have been made with gages on the wheel seat to obtain stress curves in relation to wheel positions when the wheel is pressed on. Static bending tests on a diesel axle having strain gages mounted along the body length indicate possible stress concentrations near the root of the 1½-in. radius fillet between the gear seat and the motor bearing area of the axle body.

Diesel axles tested in rotating fatigue have, until now, had the mounting wheel on the gear seat end and there has been no gear on the axle. Failures have occurred in the axle wheel seat inside the wheel bore. Four axles tested as of September 1960 were stressed below 14,500 psi and above 16,900 psi. There were no failures below 14,500 psi. Complete breaks occurred above 16,500 psi. Sufficient data is not yet available for establishing endurance limits.

The study of stresses in plates of diesel locomotive wheels has been completed. Results obtained by a series of "stop" tests run on a regular production A-40 wheel and a specially machined A-40 wheel show no large difference in the stress levels. The maximum difference was less than 20% and the average difference considerably less. The machined wheel tends to be stressed to a higher level at the outside hub fillet location. It is stressed to a somewhat lower level at the inside rim location as compared to the standard production wheel.

Studies were made of the journals on two idle tank cars to determine effects of corrosion. Three inhibitors blended with journal-box oil were tested. Damage after eight months



Reaction forces recorded by AAR oscillograph show the effect of the free fall of 27,000 lb drop hammer tup on friction draft gear.

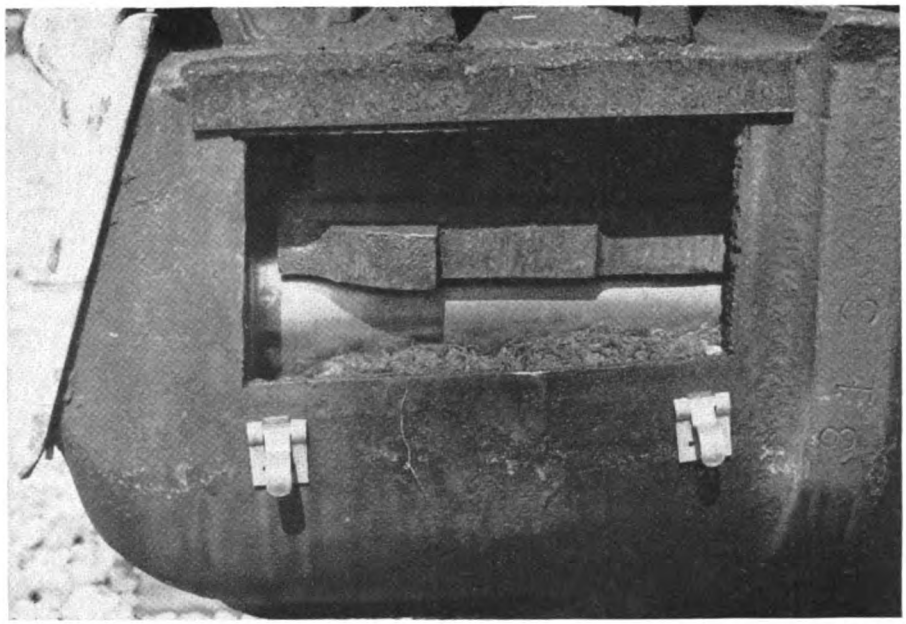
was severe; the corrosion was not significantlly reduced by any of the inhibited lubricants. Another test on passenger-car journals showed the same corrosion results. Tests are being made at the Research Center on the journals of two assembled freight-car trucks lubricated with various combinations of journal-box oil and corrosion inhibitors. Over 25 inhibitors have been screened in the laboratory. These include amines, petroleum sulfonates, volatile or vapor-phase corrosion inhibitors, organic phosphates, and naphthalene compounds. To date, a satisfactory corrosion inhibiting additive for the journal-box lubricants has not been found.

Roller-bearing greases are being studied to determine the effects of moisture in greases and the corrosive tendencies of these "wet" greases. Revised AAR grease specifications include a test for the evaluation of corrosion-inhibitive properties under humid conditions. This test, published by the Coordinating Research Council, is being used to re-evaluate all roller-bearing greases which have previously been approved for use in interchange.

Tests to extend the relubrication period of roller bearings show that grease does not deteriorate in structure, nor lose its lubricating effectiveness after service periods of three, four, or five years without relubrication. Roller-bearing grease seals have been found adequate to retain sufficient lubricant for these periods.

Development and construction of new laboratory equipment for better evaluating performance and characteristics of lubricators and other parts of the journal-box assembly are continuing. As of January 1, 1961, eleven lubricators have received conditional approval. More stringent specifications, in effect since last year, required considerable supplementary investigation, the repeating of certain basic tests, and some alterations in the laboratory machines and equipment.

Tests of oil-feed properties of waste and lubricators are continuing. These involve removing the oil fed by the lubricating medium from the rotating journal surface for weighing. Radioactive phosphorous-32 has also been dispersed in the journal-box oil to study these feeding characteristics and to establish the paths of oil flow through the lubricator system. A Geiger tube placed close to and parallel with the journal surface was used to detect the amount of radioactive material and, consequently, the quantity of oil being carried on the journal. Preliminary tests have shown a definite pattern of circulation.



Corrosion of the journals of standing cars equipped with solid bearings is being investigated Corrosion inhibitors for roller bearing lubricants are also under test.

Tests of a hot-box indicator continued during 1960. Five railroads participated in determinations of the effectiveness of the device under actual service conditions. The indicator consists of a copper tube placed in the dust-guard well which contains titanium tetrachloride for the production of smoke, and butyl mercaptan for odor. These materials are combined with a pressurizing agent to improve release through small apertures in the tube as the proper temperature is reached.

Brake Lubrication

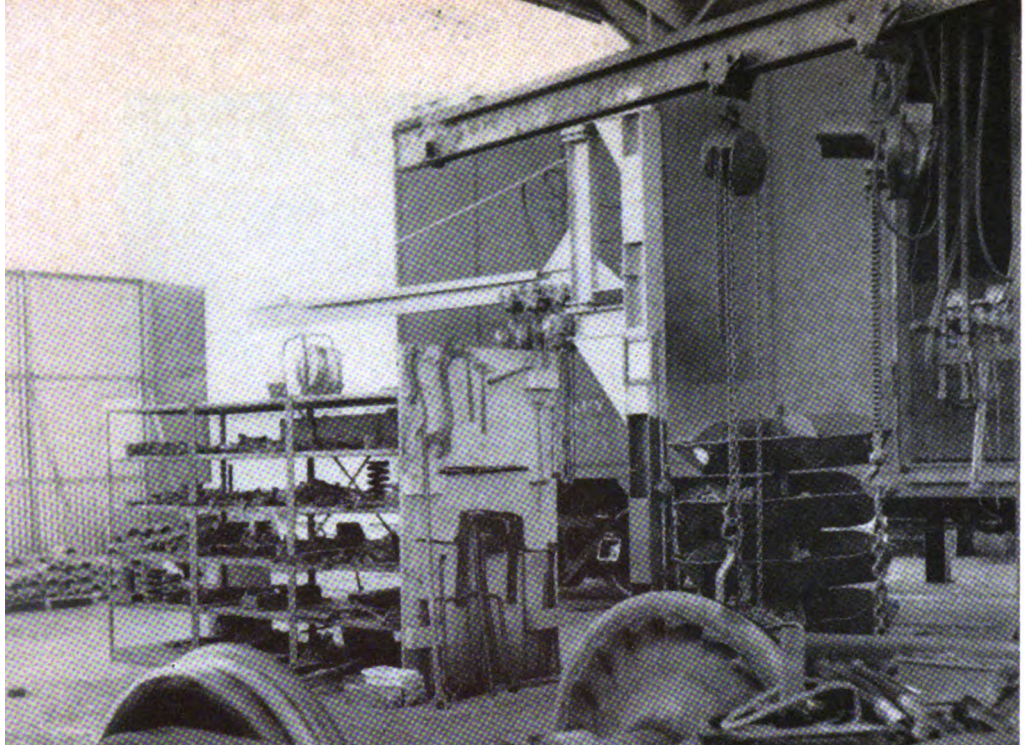
A new lubricant to improve the performance of AB valves by reducing incidence of stuck brakes has been recommended for road service tests. In laboratory tests, both AB service and emergency portions passed the rack test with the special lubricant after 97,800 brake application and release cycles in temperatures ranging from 130 deg F to minus 45 deg F. It was necessary to discontinue tests using the present M-912 valve oil after 46,230 cycles because of frequent undesired emergencies. After lubricating this valve with the special lubricant, it operated 51,480 cycles with no emergency applications.

Studies are continuing on improvements in the mechanical parts of AB valves. Several valves, modified by replacing the pistons in the emergency portions with rubber diaphragms, have been applied to captive cars for field test. Studies show it is feasible to modify the service portion in a like manner.

Tests were made to evaluate the corrosion rates of various grades and heat treatments of cast iron. Malleable iron was tested relative to ductile iron and pearlitic malleable iron. Tests were conducted under high humidity conditions with periodic immersions in water and brine. Several primers and coatings have been evaluated for possible application to freight-car structural parts. An epoxy-tar coating was found to be quite effective in brine immersion tests.

Studies made on diesel fuel filters make it desirable to rate the filter media on the basis of AAR pore size, contaminant holding capacity, and total external filter surface area. Final tests were made last year with a set of pleated paper elements made from phenolic resin impregnated paper having a mean flow pore size of 16 microns. The pleated paper elements were found to have a similar degree of filtration comparable with previous tests run on cotton-sock elements, but the pleated paper had much greater life. The Committee on Locomotives and Locomotive Fuels is preparing a specification for discharge oil-filter elements. The specification would establish maximum and minimum valves of the physical properties of the filter element and would not be dependent on laboratory performance tests.

NYC Youn



Tools and repair parts are stocked along each repair track, convenient to work "spots."

Mechanized freight-car repairs, plus complete car-cleaning facilities, are important in the operation of the New York Central's Robert R. Young electronic yard at Elkhart, Ind. During a recent typical period, an average day saw 60 cars receive light repairs; 10 to 16 NYC cars were upgraded under a planned two-shift repair program, and 150 cars were cleaned, repaired and carded on the cleaning tracks.

The car-repair area operates continuously with four carmen on each of the three daily shifts assigned to two "fast" tracks. An average of seven men work two shifts, five days a week, on the upgrading and heavy repair tracks. Three of the four repair tracks extend through a 120-ft prefabricated building. Two of these are the pair of "fast" tracks. Their uninterrupted, all-weather operation is important in the overall operation of the Robert R. Young yard.

Bad-order cars are placed on lead tracks to the repair shed. After inspection by foremen to determine exact repairs, these cars are brought into the working area by a Trackmobile. Track 1, north of the shed, is assigned for repairs to heavily damaged cars and cars requiring adjustment of loads. It is equipped with a 200,000-lb guillotine-type load adjuster, which is used for shifting loads longitudinally. Loads can be shifted transversely by jacking against the main frame of the adjuster. Some 90 to 120 adjustments are made each month. Carmen from the wrecking crane force do this work. Track 2, under the shed and equipped with a permanent A-frame and portable jacks, is frequently used for upgrading NYC box cars. This includes new flooring when needed.

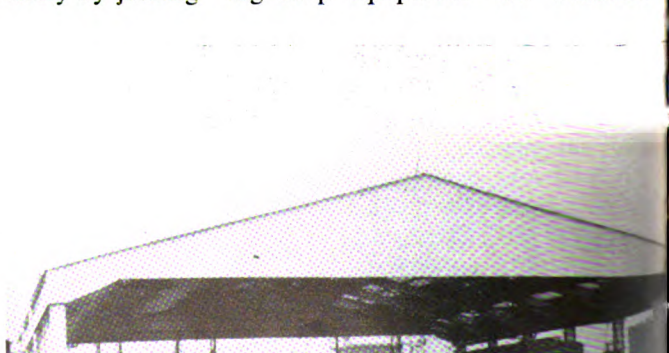
Tracks 3 and 4, the fast tracks, are equipped with permanent A-frames and Duff-Norton electric jacks, one on each side of each track. Two carmen are assigned to each track. Wheel changes, coupler and draft-gear repairs, AB brake cleaning, repacking and all other light repairs are made. Infra-red heaters are used at work locations during inclement weather.

Materials are convenient to the repair areas. Wheels, draft gears, couplers, and other heavy components are delivered by materials-handling trucks. Two complete sets of overhead reels on each of the three covered tracks supply journal oil, journal-box cleaning solvent, air, and welding current. Storeroom, office, and shop buildings are adjacent to the repair shed. These include an oil room with lubricator-pad renovating machine, wheel shop for journal work only, air-brake room, wood mill, compressor room, and boiler room.

The wheel shop turns journals on 8 to 10 pairs of wheels per shift. The machinist, on duty in the wheel shop for at least one shift daily, is also responsible for repairing and maintaining shop equipment—the Trackmo-



Wheel storage is adjacent to the machine shop which is in building containing other work areas, locker rooms, and offices.



Sheltered repair area has capacity of six cars. Wind breaks have been built between tracks at far end of the building.

Yard Has Spot Repair System

bile, two 3-ton cranes, two fork-lifts, one shop truck, one front-end loader, one tractor, and three highway trucks. The air-brake room is a two-shift operation and is equipped to clean and assemble 450 brake-cylinder pistons per month. This quantity supplies not only the Elkhart working areas, but also repair facilities at Toledo and Stanley, Ohio, and Kankakee, Ill. Pistons for reclamation are shipped in on metal pallets in groups of nine and returned the same way.

Typical Repair Force

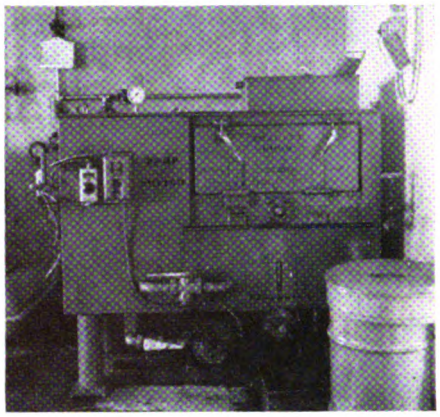
Shifts	1	2	3
Foremen	1	1	1
Foreman (wreckmaster)	1	–	–
Piston assembly repairman	1	1	–
Machinist	1	1	–
Carmen	11	11	4
Carman helper	1	1	–
Painter	1	–	–
Truck operator	2	2	2
Laborer	1	–	–

Typical Monthly Production

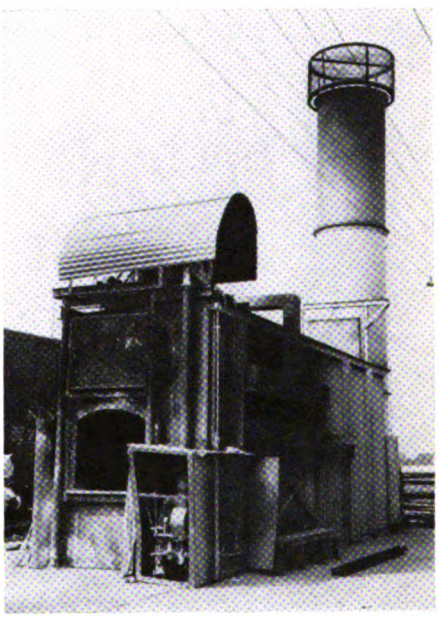
Car-servicing area:	
Cars repaired	1,890
Cars repacked	315
Wheel sets processed	584
Air brakes cleaned	122
Car cleaning area:	
Cars steamed and washed	938
Total cars cleaned	3,445
Cars repaired	1,151
Cars upgraded	157
Stock cars cleaned and bedded	183

The car-cleaning area, adjacent to the westbound departure yard and some distance from the car repair area, consists of two tracks each holding approximately 40 cars. There are supporting buildings for wash and locker rooms and material storage. The cleaning tracks are switched twice daily. Cars delivered to the cleaning track leads by yard locomotives are moved on and off the cleaning area by car pullers at the ends of each track. The force recently consisted of one foreman, six carmen, nine laborers, and two truck operators. Five carmen were doing upgrading and one was responsible for inspection and repair of safety appliances. Before the cars are moved from cleaning track, they are inspected, carded for commodity classification, and selected for upgrading.

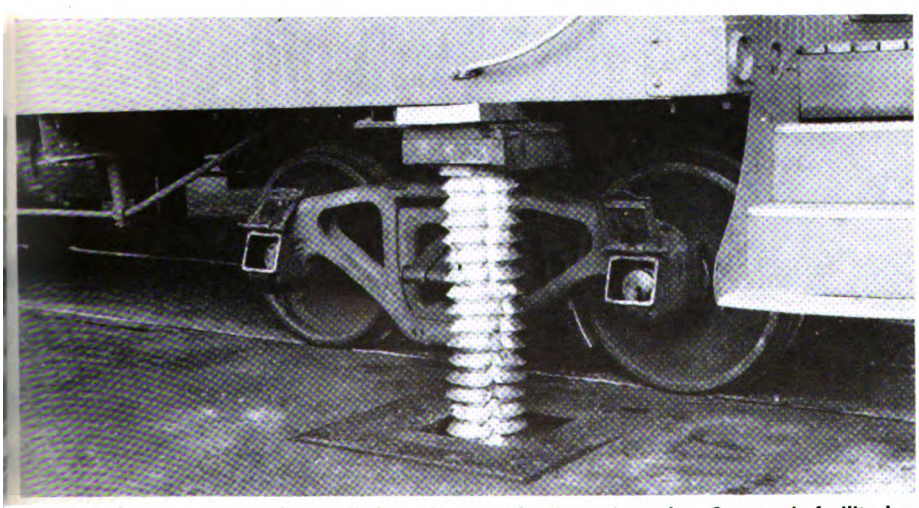
Equipment in the cleaning area includes a crane, fork-lift, tractor, and front-end loader. Burnable material is swept from cars into dumping containers which are handled by the fork-lift to the incinerator. Gondolas are spotted on two stub tracks for incombustible scrap. Upgrading may involve repairing "in kind," or the use of plywood and paper liners. When weather permits, cars are washed. A Vapor upgrader is used to clean cars previously loaded with lime, cement, or lamp black. Stock cars are cleaned on only one of the two tracks. Refuse is shoveled into bins as these cars are moved into cleaning area. After cleaning, cars are sanded and bedded by laborers using front-end loader.



Lubricator pad cleaning machine can process a load of eight journal pads in 15 min.



Incinerator at cleaning track is used for disposing of combustible trash from cars.



Electric jacks are permanently installed on the two "fast" repair tracks. Car repair facility has been in operation since Young Yard was opened in 1958.



Oil tank with 12-volt pump and 275 gal capacity is used for journal oiling in train yard.

New GP-20's speed freight on the UNION PACIFIC



Thirty new General Motors GP-20's are speeding crack Union Pacific freight trains westward from Council Bluffs to Ogden, Utah. Used on expedited freight service across the plains, new 2000-hp GP-20's are averaging 15,000 unit miles per month. Added capacity enables three Electro-Motive GP-20's to replace four older locomotives. 61-R-6

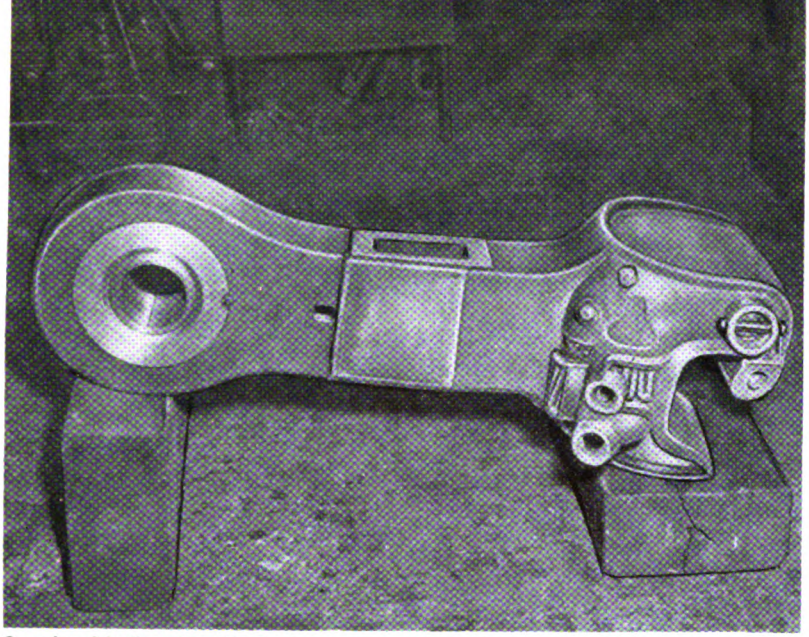
ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS • *HOME OF THE DIESEL LOCOMOTIVE*

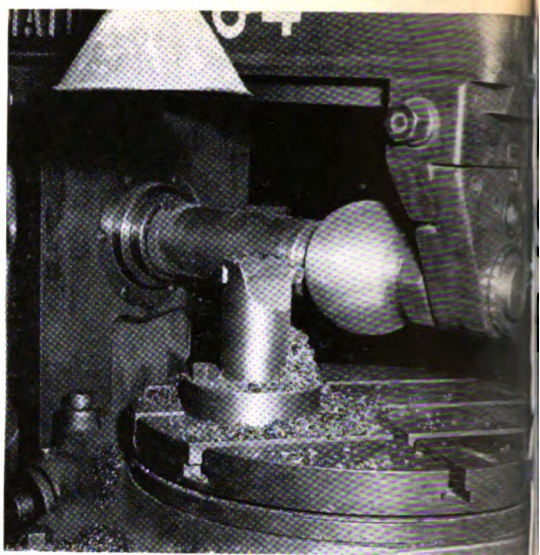
In Canada: General Motors Diesel, Limited, London, Ontario

GENERAL MOTORS LOCOMOTIVES



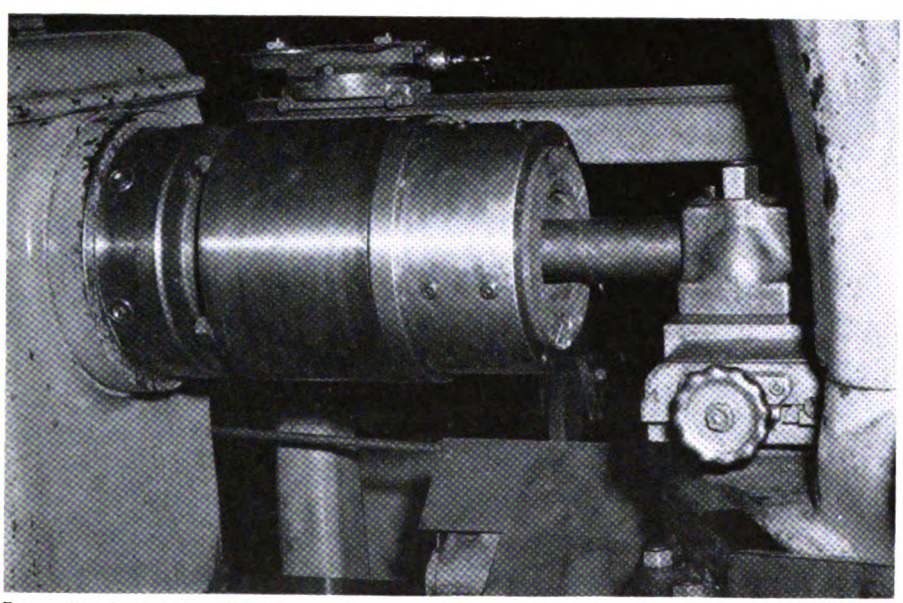


Completed ball and bushing assembly is pressed into coupler ready for service.



Ball rotates with spindle; tool post is clamped to table.

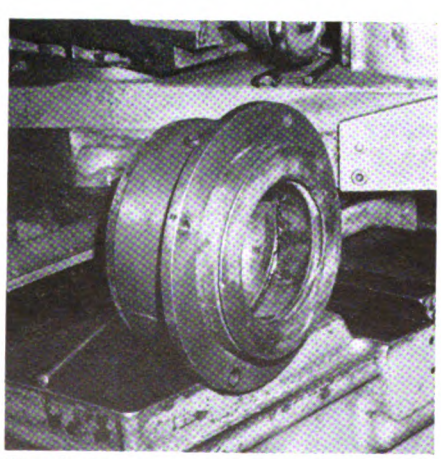
Coupler Reclamation at L&N Shop



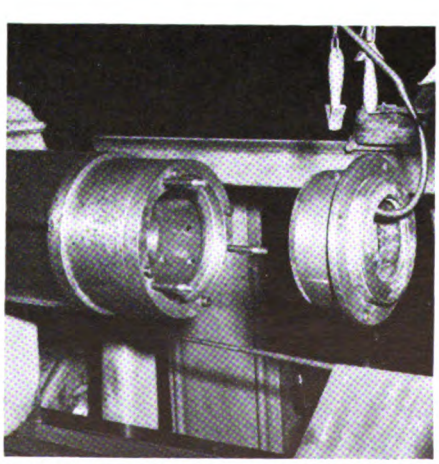
Tracer template (upper left) has contour for the machining of the proper radius on bushings. Bushings are machined to two oversizes. Entire process has proved to be economical for L&N.

Complete spherical coupler bushings and balls both for type E and H couplers are manufactured and worn bushings reclaimed to two oversizes at the South Louisville, Ky, shop of the Louisville & Nashville. The reclaimed bushings are rebored to a maximum diameter of 6⅞-in. for the second oversize, and new balls are made to suit either oversize. This arrangement enables the railroad to get three two-year cycles of service with the standard ball and bushing and the two oversizes of each.

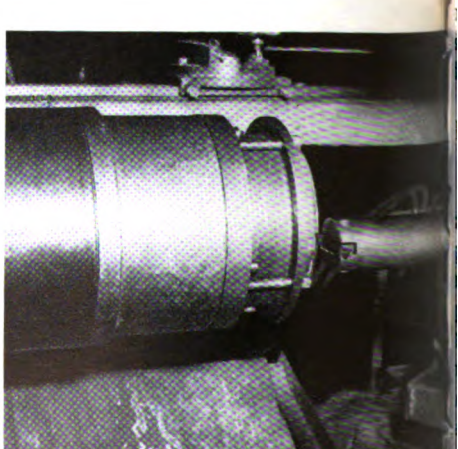
The split bushing is positioned and rebored in a fixture attached to the spindle nose of a Monarch air tracer lathe. The balls are drop forged. They are then faced, bored, and the sphere generated in a Cincinnati No. 5 milling machine.



Worn bushing mounts in fixture with set screws.

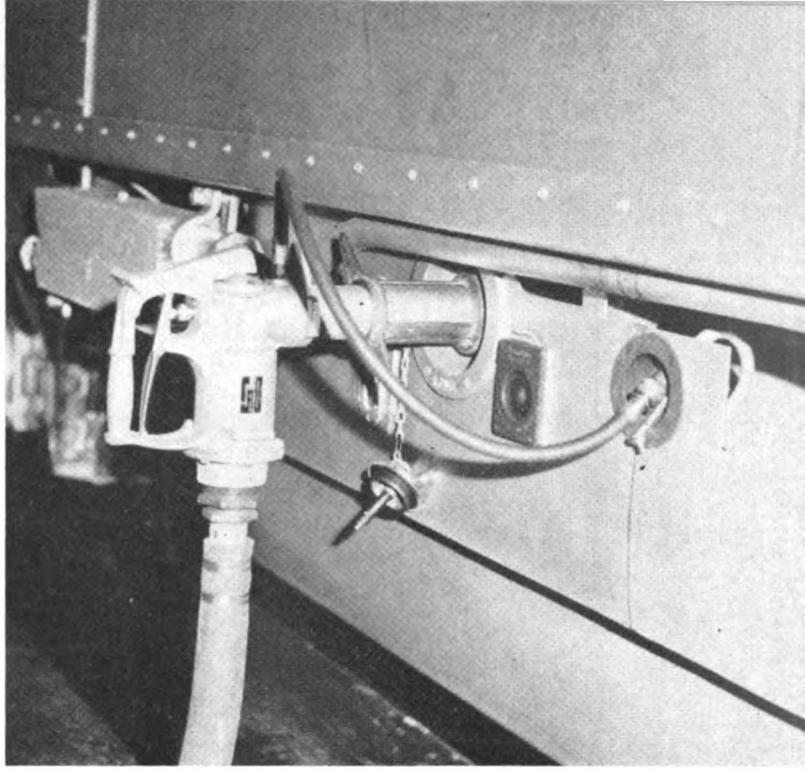


Assembly is moved to mating fixture on lathe.



Tool cuts locking ring and packing groove.

Automatic System Simplifies Fueling for Rio Grande



Fueling nozzle is connected to locomotive's filling tube, sensing line is attached to the quick-coupling fitting which transmits tank level indication, and the nozzle handle is moved to the open position. When tank is filled, the nozzle will shut off automatically.

An automatic shut-off fueling system, developed over two years ago on the Denver & Rio Grande Western, is now standard on the road. A number of installations have been made; all locomotives passing through Burnham shop at Denver are being equipped.

A. N. Bisgard, assistant chief mechanical officer of the D&RGW, was one of the designers. The system is marketed by the B. K. Sweeney Manufacturing Company.

The system is designed for application to all types of diesel locomotives. It requires no alteration of the locomotive filler tube or fueling station connectors. The standard Protecto-Seal couplings are retained. The adaptor applied to the fuel tank measures the level and, when it is full, the nozzle shuts off automatically. A 90-deg elbow applied near the top of the fuel tank is connected by a flexible hose to a quick-coupling housing mounted on the locomotive skirt. A separate mounting plate is provided for locomotives without skirts.

How It Operates

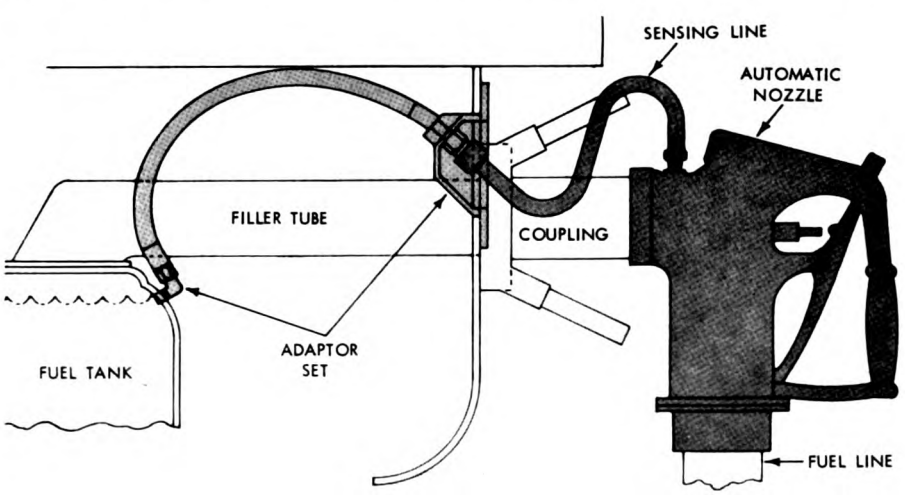
Prior to operating the system, the automatic action of the nozzle can be pretested. After the nozzle is connected to the filler tube, the trigger is pulled to start flow of fuel into the tank. Before the sensory line is connected to the quick-coupling, the operator places his thumb over the sensory line orifice. The nozzle will shut off when the orifice is closed. The sensory line is then connected to the housing and the trigger pulled to start the fuel flow. As long as air passes through the connected sensing lines between the fuel tank and the nozzle, the fuel will continue to flow.

When the fuel level in the tank reaches an orifice in the 90-deg elbow, air in the sensing line is cut off, tripping the valve in the nozzle and stopping fuel flow. The trigger position on the nozzle signals the operator that fueling is completed.

Sweeney automatic shut-off nozzles are available in 1½-in. and 2½-in. sizes. Maximum flow rates are 300 gpm for the 2½-in. size and 75 gpm for the 1½-in. size. Minimum rates are 30 gpm and 25 gpm, respectively. The 2½-in. nozzle can be set at "soft-close" to eliminate line shock when pump pressures are high and fuel supply lines are long. This feature can also be used to over-ride the control and add fuel above the orifice, completely filling the tank.

When the Sweeney nozzle is used for conventional manual filling, it is shut off by tripping a lever on top of the handle. The automatic nozzle can fuel locomotives not equipped with the fuel-tank adaptor sets. A conventional nozzle can be used to manually refill Sweeney-equipped locomotives. Average installation time of a fuel adaptor set on one side of a locomotive is approximately 2 hr.

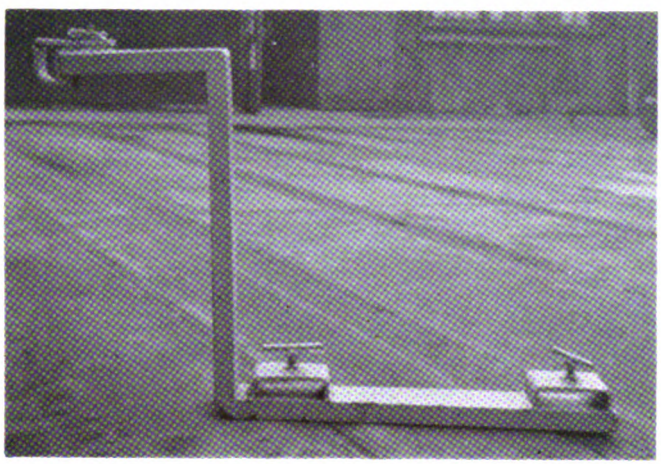
Applications on the Rio Grande at Denver include a four-nozzle fueling station at Burnham and four fueling points at the north yard plant in Denver. Officers of the road anticipate a substantial saving because of elimination of fuel-tank overflow. Locomotive servicing time can also be reduced.



Typical installation of the Sweeney automatic fueling system on a diesel road unit is shown in this diagram. Adaptor unit is mounted on special bracket when locomotive has no skirt.

CAR REPAIR TIME-SAVERS

Device for Hanging Box Car Doors



To expedite the hanging of box car doors, reduce manual labor and avoid any hazard in this somewhat difficult operation, a jig has been developed by the Brooklyn, Ore., shop of the Southern Pacific. A somewhat reinforced design is now used at other car shops on the system.

The device, used in conjunction with a fork-lift, is made of a 4-in. channel formed at the corners and carefully welded to assure full strength with a good factor of safety. The upper horizontal leg is 12¾ in. long, the vertical leg 24¾ in. long and the lower horizontal leg which engages the lift-truck fork ends, 30 in. long.

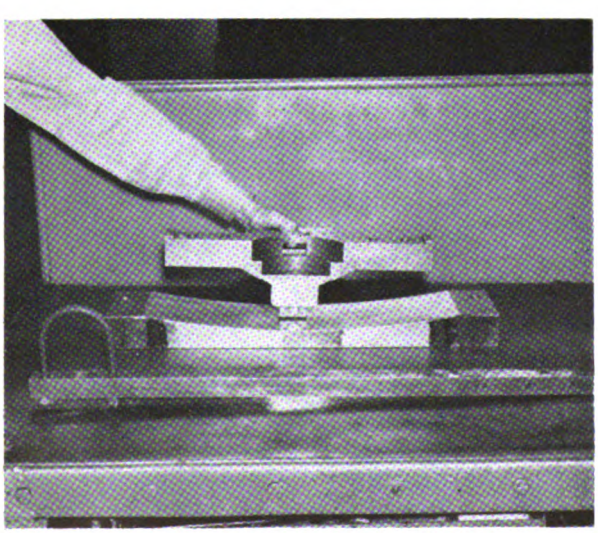
Two brackets with substantial ⅝-in. hand screws for tightening are welded to the top of the base channel in the original design, but subsequent units have another 4-in. channel welded to the base of the jig to form a box section. Two 1-in. by 5½-in. holes, spaced 17 in. apart, are cut through the channel flanges for insertion of the lift-truck forks. Additional stiffness is also provided by two corner braces.

At the end of the upper horizontal arm of the jig is a U-shaped hook and pivoted cover plate with suitable locking pin to avoid any possible disengagement of the lifting chain, generally attached to the box-car door at the placard board holes or door handle, whichever is more convenient.

In operation, the door is simply raised to the desired elevation by the fork-lift truck which moves alongside the car. One man guides the door as it enters the track. It is then pushed forward by the truck until fully supported on the track. Fifteen minutes or less are required to apply the average box-car door with practically no manual labor or chance of personal injury.

This jig is reversible and can be applied to the lift-truck forks in either position. It can be used for hanging doors on either side of the box car.

Tool for Milling Journal Bearing Wedge Dies





Steel guide and machined follower with clevis-mounted ball bearing (left) make up device installed on the vertical miller (right).

A device to simplify milling of dies for the reforging of journal bearing wedges has been developed by the Illinois Central at its Paducah shops. A steel guide, machined to a 50-in. reverse radius, is bolted on top of the die block. A permanent transverse center-line on the guide coincides with the center-line layout on the die block so as to center the radius properly with relation to the finished die. A machined follower is fitted with a clevis-mounted ball bearing to roll longitudinally and crosswise on the guide radius. It is bolted to the movable head of the vertical miller. The head is disengaged from power feed. Counterweights suspended from a steel bar clamped to the hand feed handle hub by a U-bolt keeps the ball bearing pressed against the contoured guide.

The vertical adjustable crosshead containing the ball bearing mount must be moved upwards and locked each time the tool is set for a deeper cut, because the tool cannot be lowered otherwise. All cuts are started on the center-line where the maximum cut is taken, and worked towards the ends. Use of this device saves $75 per die set, eliminates hand grinding, and cuts errors.

Brake Applications Limit Wheel Slip

Slip suppressing brake has proved effective in controlling slip of high-horsepower locomotives

By J. C. Aydelott

Correction of wheel slip on American diesel-electric locomotives has usually been some scheme for automatically reducing or completely removing and reapplying power to traction motors. Single-unit electric locomotives in Switzerland have employed the so-called anti-slip brake, a manually operated type of wheel-slip correction (RL&C, Jan. 1957, p 46). This scheme, now known as the slip suppressing brake, has been adapted for American application and installed on the General Electric 2,500-hp U25B diesel-electric locomotive (RL&C, June 1960, p 25).

In correcting wheel slip, there is a basic difference between the slip suppressing brake and the traditional arrangements for reducing power. When one of a locomotive's axles is slipping, it is running faster and at lighter load than those which are not slipping. Because the slip suppressing brake is applied equally to all axles, maximum power is absorbed from the slipping axle and minimum power from the non-slipping axles.

Power reduction decreases the input to all axles proportionally and, therefore, takes the least power from the slipping axle because it is already only lightly loaded. With the slip-suppressing brake there is minimum disturbance of engine output. When the slip is corrected, the locomotive is once more delivering full horsepower with minimum loss of time.

The slip suppressing brake employs most of the regular air-brake system. The truck brake arrangement is unchanged. On the locomotive platform a relay valve is placed as close as possible to each truck and connected to it with a large, short pipe to insure application in minimum time. The relay valves are supplied with air at 140 psi from the main reservoir and are actuated by an air signal. The pressure which comes to them through the control pipe is promptly reproduced in volume in the brake cylinders. This is the way in which normal brake applications are made.

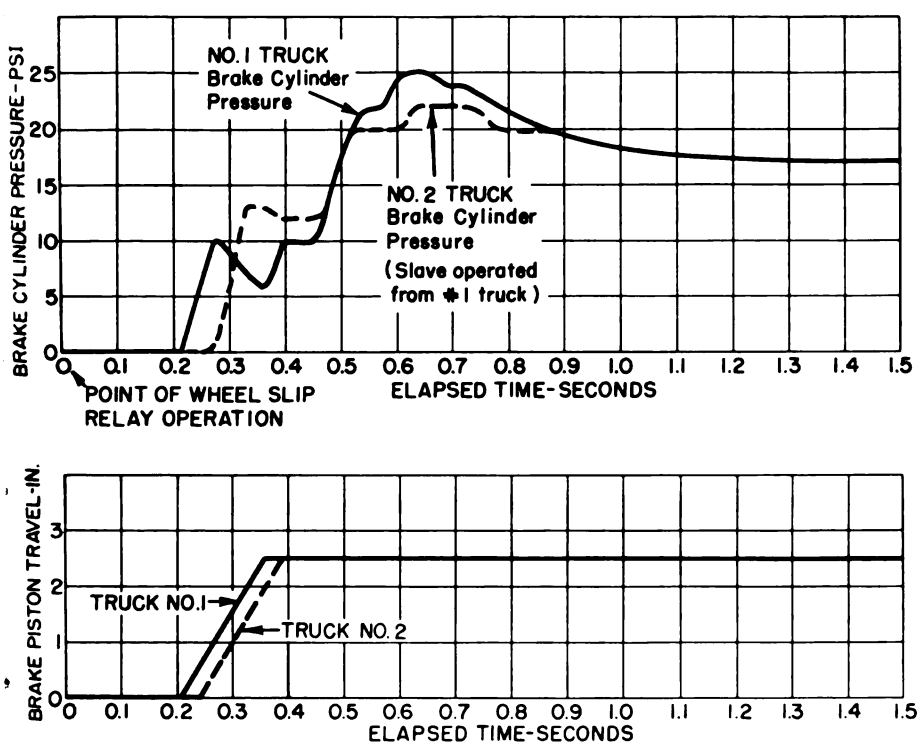
All the equipment on the locomotive is necessarily well maintained for the basic function of mechanical braking. The added brake devices for the slip suppressing brake are low in cost, few in number, extremely reliable, and require maintenance only at the time that other air brake devices receive maintenance. The slip suppressing brake function involves relatively light duty for the brakes and results in only a negligible increase in wheel and brake-shoe wear. It does not increase the overall duty on the compressor appreciably. An individual application consumes only 16 cu ft of air. Succeeding slips require less air because the time delay reservoir will be charged. A slip every five seconds, a highly improbable maximum, results in less than 20% load for the compressor.

To achieve slip suppression, a 15 psi signal is fed to the relay valves. This is introduced through a shuttle valve, sometimes called a double check valve. It resembles a pipe tee with the central leg feeding the relay valve control line. The shuttle signals the relay by moving to connect one or the other of the legs of the tee, whichever has the higher pressure. A 15 psi pressure is produced by a specially designed pressure regulating valve. This is connected to the locomotive air supply and is turned on and off by a magnet valve.

The pressure regulating valve is designed to provide the fastest possible application of the slip suppressing brake by deliberately letting the control pressure overshoot momentarily and then bringing it back to 15 psi. While the magnet valve is closed, no air is flowing and the pressure regulating valve is in wide open position.

When the magnet valve opens, high-pressure air rushes through the pressure regulating valve and into the relay valve. A corresponding surge of high-pressure air enters the brake cylinders

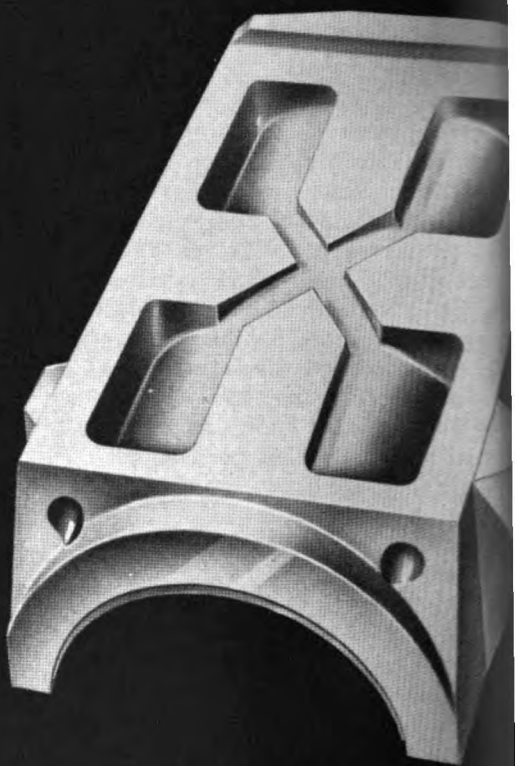
Mr. Aydelott, Advance Locomotive Project, General Electric Co., Erie, Pa.



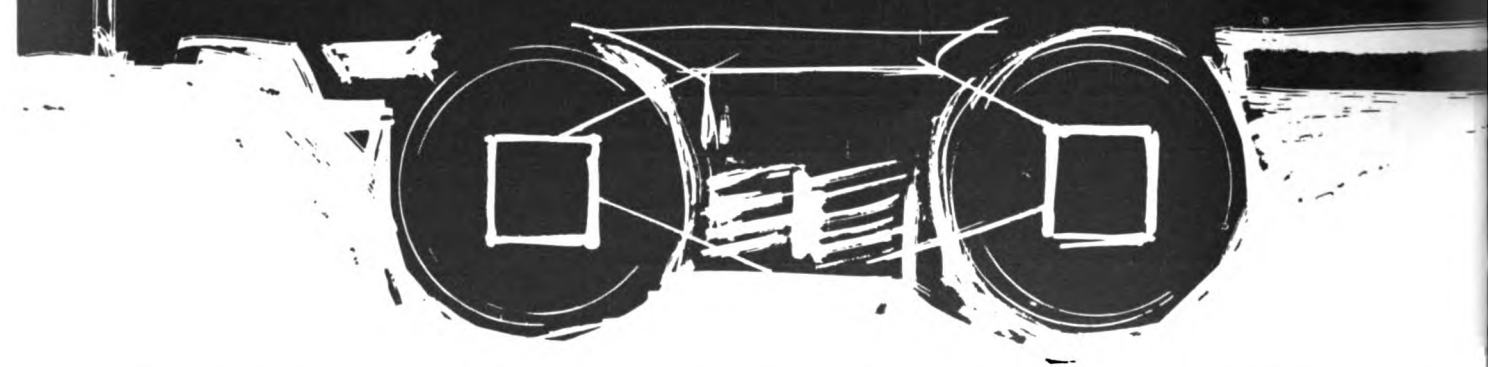
Response of the slip-suppressing brake is rapid and effective. Brake cylinder pressure initially overshoots final setting and then is regulated to proper 15 psi value.

POSITIVE CONTROL

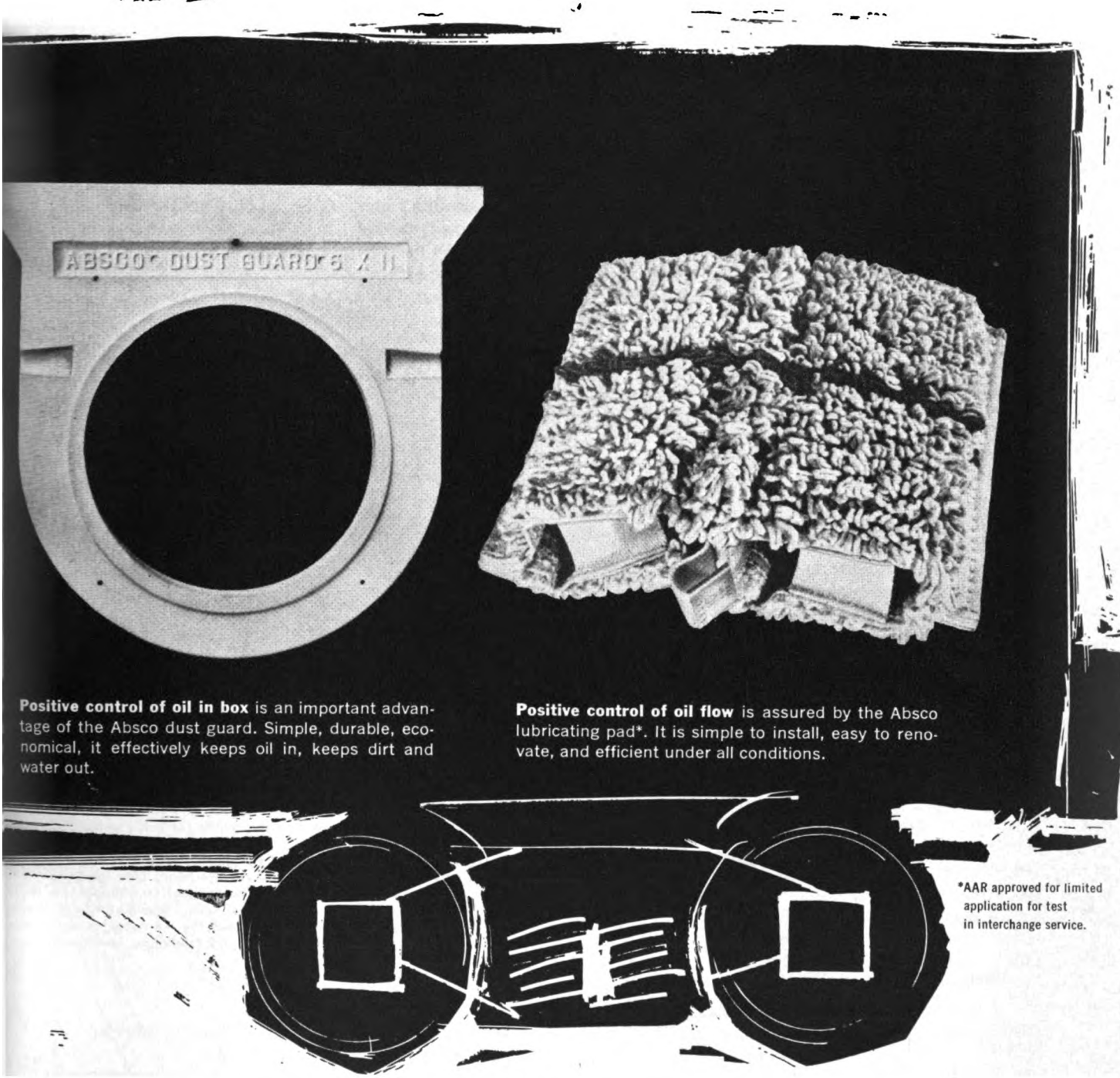
KEY TO BETTER JOURNAL BEARING PERFORMANCE



Positive control flatback bearing* achieves st
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■ Dollar for dollar, this Absco positive control "package" appears to be the most efficient bearing assembly available. Applied to the average interchange car of today and tomorrow, it gives highest promise of upgrading bearing performance for the total fleet. ■ The key to this concept is positive control of journal and bearing motion, positive control of oil in the box, and positive control of oil flow to th journal. ■ To stabilize the axle, without the expense of jou nal stops and box modification, use Absco positive contr flatback bearings. To keep oil in the box and foreign mat rial out, install simple, inexpensive Absco dust guards. T feed sufficient quantities of oil to the journal, rely on Absc



Positive control of oil in box is an important advantage of the Absco dust guard. Simple, durable, economical, it effectively keeps oil in, keeps dirt and water out.

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to start the pistons and brake shoes. The regulating valve senses its output pressure through an orifice. Orifice size has been chosen experimentally so that the rush of air is cut off at about the time the brake shoes hit the wheels. The pressure then levels off and is regulated at 15 psi. If the brakes are adjusted for minimum travel, a slight overshoot in pressure may occur for a short time, but this does no harm.

Should the regular brakes be applied at any time while the slip suppressing feature is functioning, the shuttle valve changes position as soon as the pressure in the control line exceeds 15 psi and the regular air-brake control takes over. It also prevents loss of brakes if any trouble should develop in the slip suppressing devices.

M-U Problem

In Europe, locomotives are used as single units, and the operator is expected to respond to any slipping which may occur. In many cases, he knows his route so well that he is able to anticipate slipping. He presses a button which actuates the magnet valve and slip suppressing brake. While the U25B locomotive has such a push button which may be used by the operator, the prevalence of multiple-unit locomotives on American railroads made it necessary to provide also for completely automatic operation of the slip suppressing brake.

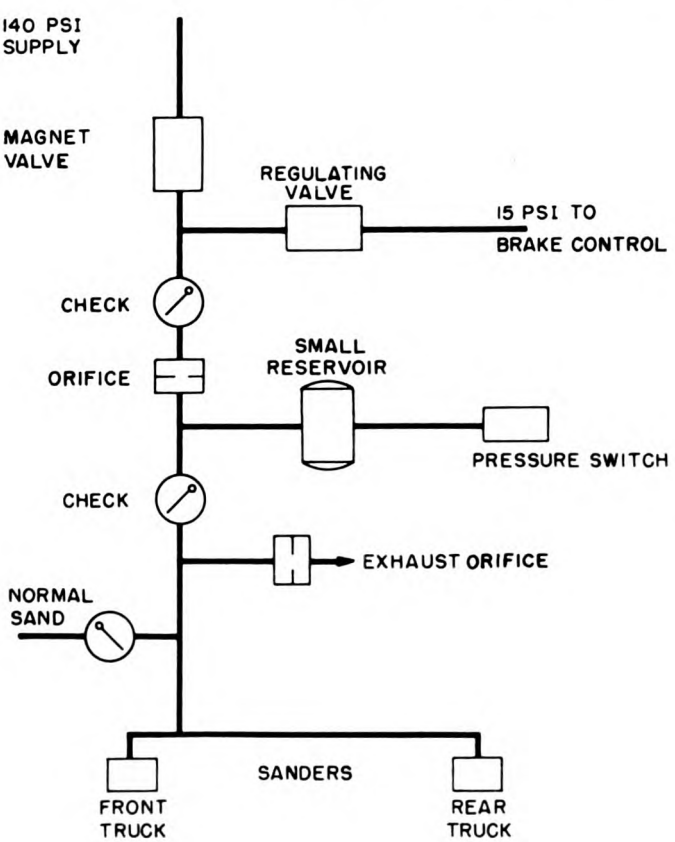
For automatic operation, a dependable slip detection system is necessary. The U25B locomotive is equipped with the GE adhesion loss detection system (RL&C, May 1959, p 47). A small, sturdy alternator is installed on each axle. Outputs of these are compared continuously, and difference in speed of the several axles produces a signal.

If the locomotive is operating under power when a slip is detected, several things occur automatically on the slipping unit before the operator's warning light and buzzer come on. This time delay is intentional. It is recognized that enginemen on most locomotives have not been aware of the great amount of slipping which occurs at high locomotive speeds. Because most slips can be corrected automatically, it is considered better not to call them to the attention of the operator. When several units are operating in multiple, it is an advantage to have each unit take care of its own slipping.

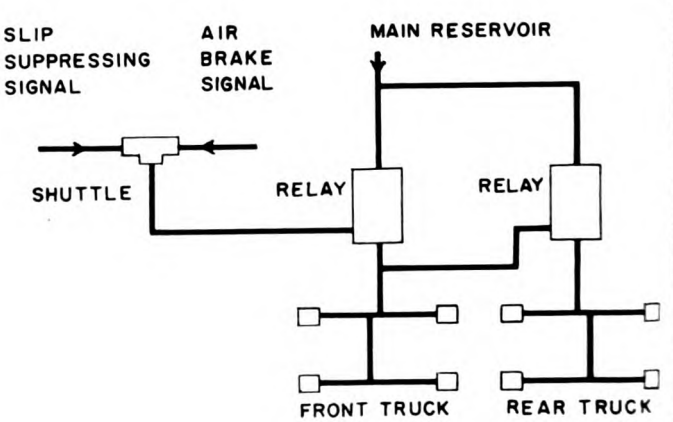
The adhesion loss detector works equally well at all locomotive speeds. This is particularly important on a high-horsepower locomotive where undetected slips at high speed might continue for miles. Such a condition would involve loss of horsepower.



Locomotives on which the slip suppressing brake has been tested are the two U-25B demonstrators which General Electric put on the road last summer. Seven months of operation on 14 main-line railroads, according to GE, "demonstrated the capability of the twin units to integrate with regular locomotive fleets and to pull fast freight trains with fewer units." During their demonstration runs, the two units were assigned to high-speed piggyback trains, conventional through freights, and slow-speed, heavy-drag operations. One road assigned the two U-25B's to handle a high-speed freight run which is usually 3,500 to 4,000 tons and is regularly pulled by three 1,500-hp units. The accepted five-hour running time was better by about one hour. One road found that the two units could handle 190 cars, about 16,000 tons, "in faster running time than the conventional units," and that they performed well on wet rail. Enginemen said the 16-notch controller was helpful in starting heavy trains and regulating low-speed operations.



Arrangement of the quick-slip-suppressing brake control which incorporates time delay in sanding and in giving slip indications.



Schematic of air piping involved in application of slip-suppressing brake. Components were developed by New York Air Brake Co.

damage resulting from over-speeded traction motors, and sometimes motor and generator flashovers.

Quick slip detection and prompt slip correction help keep traffic moving at top speed. Detection of very small differences in axle rpm is not practicable. Allowance must be made for differences in wheel size.

The standard adhesion loss detector was modified to determine axle acceleration as another means of detecting slip. A rate of acceleration was chosen that is a little above the maximum acceleration that might be experienced for the whole locomotive in special service, such as kicking cars. Use of the acceleration feature to detect slipping is especially valuable when slips occur suddenly. This feature permits correction sooner and before the rapidly accelerating axle can reach such a high speed that appreciable time would be required to bring it back into rolling contact with the rail.

In some cases, slip does not occur suddenly and acceleration might not be sufficient to give an indication. The speed differential feature then comes into action and the slip is corrected. In such cases, excessive speed is not a problem and, because adhesion is partially effective, the loss of tractive effort is minor.

Slip Correction

Whenever slipping results in rapid acceleration or produces the selected difference in axle speeds, a sensitive relay operates in a few milliseconds and in a tenth of a second, the contacts of a power relay close and several slip corrective measures are initiated. Initially, the slip suppressing brake is applied. It is fully applied on both locomotive trucks in less than one-half second. This corrective action is so prompt and so effective that most slips are arrested and the full pulling power of the locomotive restored in a matter of two or three seconds.

The U25B locomotive control is also designed to take care of exceptional conditions. The magnet valve which actuates the slip suppressing brake also feeds 140 psi air through an orifice into a small reservoir, which continuously discharges through a small outlet orifice, providing a time delay system. In case of slip last as long as three seconds, air pressure builds up to a point which initiates sanding, and the closing of a pressure switch actuates the light and buzzer in the operating cab.

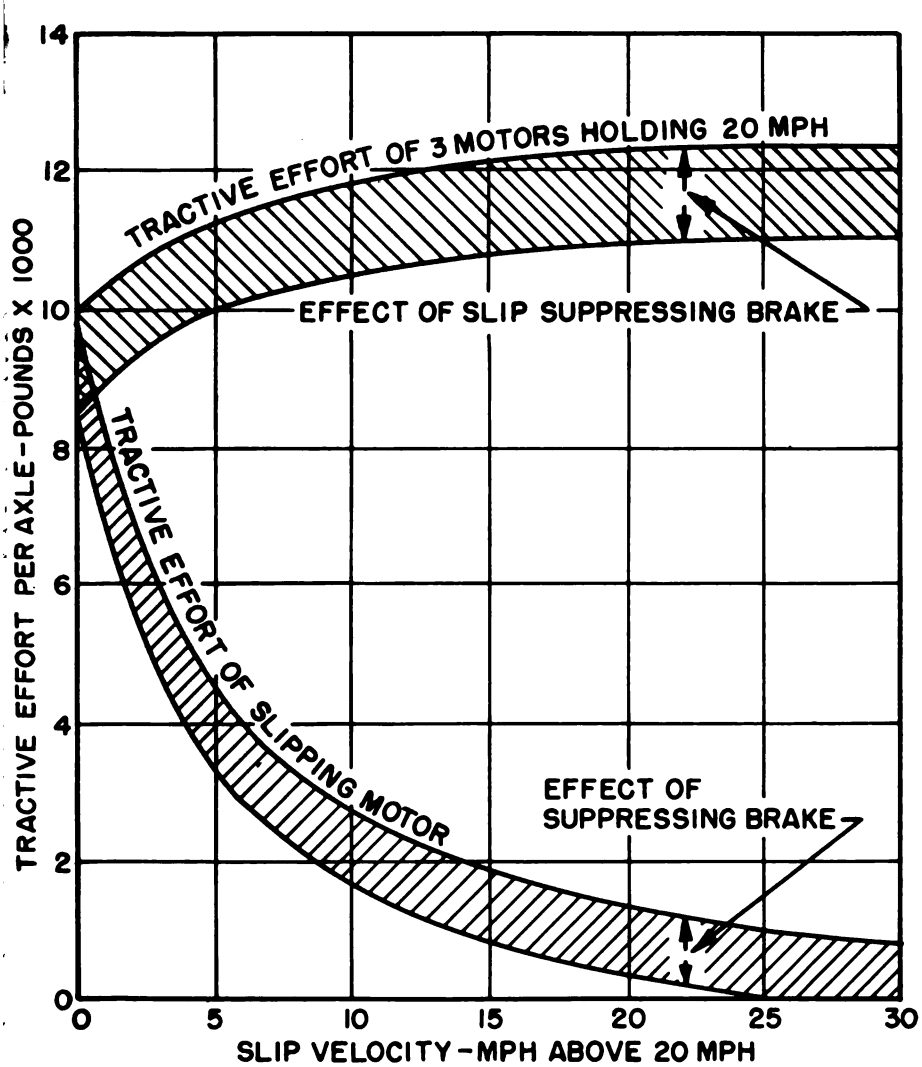
This is the first warning that the operator has that one of his locomotive units is slipping. It also tells him that the slip suppressing brake has been applied, that automatic sanding is taking place, and that the power of the slipping unit is being gradually reduced. After the operator has become accustomed to this system, he will know that he can wait to see what happens next. With experience, he will develop judgment to decide whether he need take any action. When the slip signal stops, the brake, buzzer, and light are all cut off. This occurs while there is still a speed difference of a few miles per hour between the various locomotive axles, so automatic sanding is continued briefly until the pressure in the small reservoir leaks off.

The same signal which quickly applies the slip suppressing brake and, after a time delay, provides automatic sanding, simultaneously reconnects the excitation circuits to reduce power on the unit which is slipping. The exciter field current is reduced as the magnetic flux in the exciter decays and this, in turn, reduces the main generator field current as the magnetic flux in the main generator decays. Since both fields normally operate in a somewhat saturated state and one follows the other, only a small gradual reduction in traction motor current results.

The overriding solenoid in the engine governor is also energized in such a way that it moves the load control potentiometer toward minimum field. Its movement from maximum field position to minimum field position takes about 20 seconds. Generally, the prompt application of the slip suppressing brake with the occasional help of automatic sanding corrects slips so rapidly that there is very little reduction in engine output.

When the operator chooses to notch back on the throttle, power on all units will be reduced. This reduction will be greater on units on which the load control rheostat has already reduced

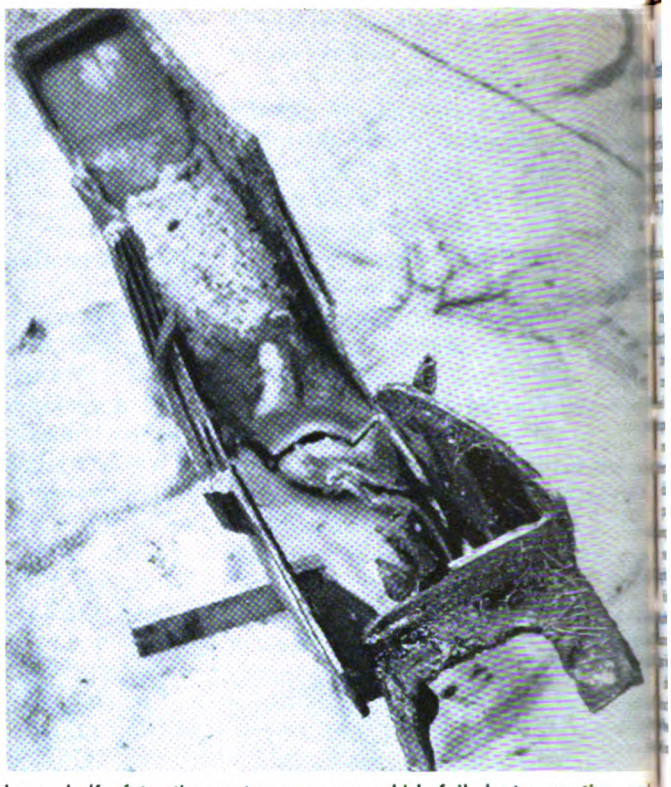
(Continued on page 45)



Slipping characteristics and effect of the brake during slip with 2,500 hp for traction and all four motors in parallel. One motor is slipping and three are holding a constant 20 mph.



Crankcase explosion caused by hot bearing was one of several which occurred during the year. It resulted in one injury.



Lower half of traction motor gear case which failed at mounting pad dropped to track and derailed passenger train, injuring 23.

Annual ICC and ICC Bureau reports . . .

Locomotive Condition Improves; Car

ICC reports for 1959 and 1960 show diesel engines, brake equipment, and sanders to be the locomotive components most frequently found defective during inspections made under the Locomotive Inspection Act. The 49th annual report of the Director of Locomotive Inspection, covering fiscal 1960, reveals that 10.1% of the units checked during 105,702 separate inspections showed "defects or errors in railroad inspection that should have been corrected before the locomotives were put into use."

The 10.1% rate was a drop from the 10.3% of other-than-steam units found defective in 1959. There were 32,186 of these units in service in 1960; 31,862 in 1959. The Director reported that last year "531 locomotives were ordered from service because of defects that rendered the locomotives immediately unsafe. This was a decrease of 117 locomotives compared with the preceding year."

The 50 accidents attributable to locomotive defects during 1960 resulted in 81 injuries. During the previous year there were 66 accidents and 90 injuries. There have been no fatalities resulting from locomotive defects since 1956.

How Frequently Do ICC Inspectors Find Defects on Diesel and Electric Locomotives and MU Cars?

	Locomotives	
	1959	1960
Units reported	31,862	32,186
Units inspected	102,149	105,702
Units defective	10,473	10,638
Total defects	31,171	31,427
Per cent defective	10.3	10.1
Ordered from service	628	517
	Mu Cars	
Units reported	2,717	2,671
Units inspected	2,231	2,571
Units defective	362	450
Total defects	834	1,254
Per cent defective	16.2	17.5
Ordered from service	4	11

"Of the 50 accidents," the Director of Locomotive Inspection comments, "10 were caused by the defective condition of floors, steps, and passageways of diesel-electric locomotives. Seven of the 10 resulted from accumulation of oil on walking surfaces, a reduction of 5 compared with the preceding year. Eight accidents were caused by defective condition of cab seats, compared with 12 in the previous year."

Safety Appliances

The report on safety appliance inspections by the ICC Bureau of Safety and Service, Section of Railroad Safety, shows that, while locomotives were in somewhat better condition in 1960 than had been the case in 1959, both freight and passenger cars were found in somewhat poorer condition. Agents of the Section of Railroad Safety found 5.40% of 1,579,463 freight cars with safety appliance defects last year as compared with

ost Common Defects on iesel and Electric Locomotives

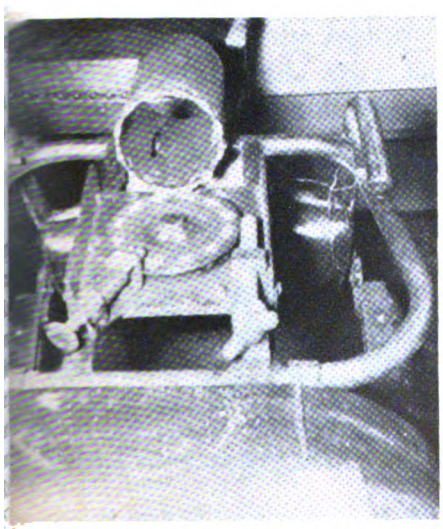
rtial list of parts defective, inoperative or issing, or in violation of ICC rules found uring inspection of 102,149 in 1959, and 5,702 in 1960.

	1959	1960
ake equipment	3,477	3,617
ıbs and cab windows	1,419	1,407
ıb floors, aprons, and deck plates	2,768	2,461
ontrollers, relays, circuit breakers, magnet valves and switch groups	613	704
el system	3,343	2,702
spections and tests not made as required	682	1,063
ternal-combustion engine defects, parts and appurtenances	6,555	7,184
mpers and cable connectors	355	350
ghts, cab and classification	480	404
otors and generators	787	821
nders	3,613	3,602
rings and spring rigging, driving and truck	542	512
ucks	823	765
heels	382	798
iscellaneous	1,491	1,400

eet Shrinks

.81% of 1,183,040 in 1959; 1.04% f the 122,151 locomotives had these efects in 1960, a figure which was own from 1.28% in 1959.

Air brake tests were observed on ,708 freight trains—233,333 cars—



ab seat failures like in weld between the stand nd frame have resulted in injuries.

by inspectors during the past fiscal year. Proper tests were observed on 3,051 of these trains (67.6%), and improper tests on 717. Proper tests were observed on 94.9% of the passenger trains. Inspectors also observed air-brake shop practices 977 different times and rated 87.7% of these as proper.

Brake Defects

Commenting on air-brake defects, the Section on Railroad Safety reported the following about the cars and locomotives which were checked:

	1959	1960
Air brakes cut out or inoperative	1,608	2,380
Air brakes not cleaned in required period	2,253	11,373
Excessive piston travel	3,573	6,397
Total	7,434	20,150

Few units were found with out-of-date brake cleaning during 1959 because that covered the period when AB brake cleaning was being extended from 36 to 48 months. The Section reported that the increase in the number of cars and locomotives found with excessive piston travel in 1960 was due to the fact that the number of trains observed went up from 2,845 in 1959 to 4,595 in 1960.

The annual report of the Interstate Commerce Commission indicated concern about the shrinkage of the U.S. freight-car fleet, which went down 73,481 cars. After conceding that 1960 installations might "more nearly equal normal retirements," the report hastens to warn that "this degree of balance may be short lived unless large orders are placed soon as the backlog was declining rapidly . . . The freight-car supply situation has been a serious problem for many years. Inadequate car ownership and inefficient utilization of existing equipment on the part of some carriers have been the prime factors causing such shortages. The situation has also been aggravated in recent years by a substantial increase in percentage of unserviceable cars."

Total Class I freight-car ownership on January 1, of this year was 1,661,577, and the bad-order ratio, 9.4%.

"Enactment of recommended legislation would assist the Commission in coping with this problem by authorizing it to prescribe per diem rates which would provide an economic incentive to the carriers to procure and maintain an adequate supply of freight cars."

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PEDRICK PIONEERED *Conformable* RINGS FOR BIG-BORE ENGINES

Mitchell's Runaway Horses

y **Jon Maurice**

Red streamers across the western y marked the end of day as Fore- in Brad Sparks headed out of the op toward the inbound lead at the esel terminal. Brad had just had ord that locomotive 154 on the ex- ess had encountered trouble, result- g in some delay. As he walked, ad recalled that 154, a three-unit, 000-hp Alco, was one of the few t yet rebuilt with the latest electrical uipment.

As the big Alco rolled to a stop, ad noticed the lead unit engine was ent. Engineman Cy Mitchell's wor- d expression changed to a grin when spotted Foreman Sparks.

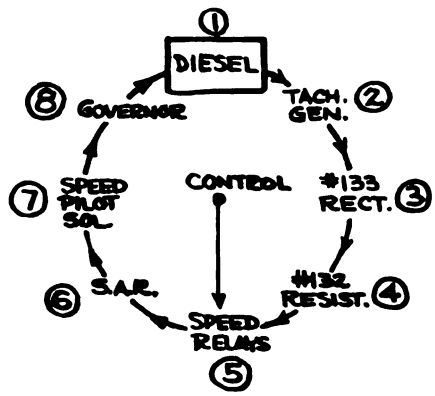
"Hello Cy;" said Brad, "what hap- ned to your engine?

"Don't know exactly," exclaimed ngineman Mitchell; "the 2,000 orses' on this A unit took the bit in eir teeth and ran off. We were just ming out of that sag at Oak Hollow. opened the throttle to eighth notch id this engine just speeded up till e 'overspeed' tripped. We reset the verspeed and tried again. Same thing ppened. If you don't mind, I'd like stick around to see what got into ese horses."

"All right," said Brad; "let's get on id see what's wrong."

Brad and the engineman were stand- g at the engine control panel when lectrician Bender came into the unit ith test meters and tools. Bender as told to place an ammeter in series ith the speed coil circuit. "A num- er of things could cause trouble in at circuit," Brad explained, hastily awing a sketch in his notebook and owing it to the engineman.

"I have numbered the major com- onents of speed control, starting with ne engine as '1.' The tachometer gen- rator, 2, is driven off the engine gear ain with its frequency and output oltage proportional to engine speed. detects changes in engine speed and roportional current is fed through ie speed control circuits to the speed



Brad's sketch showed the engineman the components of the Alco speed control system.

pilot solenoid on the engine governor. One of the first checks must determine if the 'tach' generator is supplying operating current. Electrician Bender has an ammeter in series with the speed coil circuit on the d-c side of the '133' rectifier. Let's start the engine and see if the tach generator is doing its job."

When started, the engine idled at higher than normal speed. Brad pointed out that the governor-to-rack linkage was vibrating and that the speed pilot was buzzing. Engine speeds proved to be high in all eight throttle positions. Brad turned the EC switch to off position, shutting the engine down.

"I was getting readings on the meter," Bender said, "but there's something erratic about this speed circuit."

"Everything points to that tach generator," Brad replied. "High engine speeds, vibration of rack linkage, and buzzing at the speed pilot solenoid all indicate that the tach generator has a winding defect, maybe an open phase, or that there is something wrong on the a-c side of the '133' rectifiers."

Quick inspection of the amphenol plug at the tach generator and of the "133" rectifier connections revealed no defects. Brad instructed Electrician Bender to obtain a new tach generator from the electrical shop. "Our trouble is probably an open phase in the generator windings," Brad explained.

"Golly," exclaimed Engineman Mitchell, "there certainly is a lot going on back here when I move that throttle up in the cab. That little gadget at the governor has me puzzled. What did you call it?"

"Speed pilot solenoid," replied Brad. "That's '7' on your sketch. It positions a balanced hydraulic valve as commanded by the current furnished by the tach generator. The position of the pilot valve is determined by a balancing or unbalancing of two forces. A *mechanical* force, in the form of a reference spring, exerts an *up* force on the pilot valve. A *magnetic force,* created by tach generator current passing through the speed coil windings, exerts a *down* force. A current of 0.475 amp flowing thru the speed coil windings creates a magnetic force *down,* equal to the mechanical force of the reference spring *up.* This is called a balanced pilot valve. Oil ports in the pilot valve, which permit the flow of oil under pressure to the governor slave pistons to operate the engine fuel racks, are blanked off in the balanced position. The engine speed is held at speeds corresponding to the throttle positions."

"Well," asked Engineman Mitchell, "if this pilot valve is balanced, how do we get more speed out of the engine?"

"Easy," said Brad, "let's assume this engine is in Run 1 speed, remembering the speed pilot valve is balanced. When the throttle is moved to Run 2 position, a circuit energizes the speed relay AVS to insert additional resistance in the speed coil circuit. Tach generator current is reduced to below the 0.475 amp needed to balance the pilot valve. The valve is now unbalanced in the *up* position. Mechanical force of the reference spring is greater than the magnetic force of the speed coil. Oil now flows to the *speed increase* components of the governor. As engine speed increases, tach generator voltage increases proportionally. Engine speed will increase until the tach generator voltage increases sufficiently to deliver 0.475 amp through the additional resistance, again balancing the pilot valve." *(over)*

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(2886)

"What happens if I move the throttle back from 2 to 1 to reduce speed?" asked the engineman.

"Well," answered Brad, "when the throttle is moved from 2 to 1, speed relay AVS drops out, removing the resistance from the speed coil circuit. Current to the coil goes *above* .047 amp and the magnetic force *down* overcomes the reference spring, forcing the pilot valve *down*. Oil flows to the *speed decrease* components of the governor. Engine speed drops until the tach generator is again delivering 0.475 amp to the speed coil, balancing the pilot valve and holding the engine at Run 1 speed."

"I'm beginning to see the light," said Mitchell. "How is speed set for each of the eight throttle positions?"

"Electrician Bender has just about finished installing the new tach generator," Brad responded, "but we will clear up your question before we check the results. Engine speeds in each of the eight throttle positions are set by adjusting the notching resistors, using a master tachometer to indicate correct engine speeds. Adjustment of the '132' resistors varies speed coil circuit resistance to obtain manufacturer's specified RPM for each throttle position."

"All set for a check," the electrician called.

"OK," said Foreman Sparks, "you have the master tachometer plugged in the panel, so we'll crank the engine and check performance."

Brad started the engine and noted the idle performance was smooth and normal. Speed was almost correct. The rack linkage was steady; there was not buzzing at the speed pilot solenoid. Brad told Bender to check the RPM in all throttle notches and make necessary adjustments. He explained to Engineman Mitchell that slight differences in the new tach generator windings and permanent magnets could make it necessary to reset speeds.

"Our trouble was a defective tach generator?" asked Mitchell.

"Right," said Brad. "Apparently there is an open phase in the internal windings. This case has been quite simple to diagnose. It did permit me to explain the major components and the basic concept of speed control. From the tach generator to the engine fuel racks there is a chain of command which makes it possible to release and control those 2,000 horses."

(Continued from page 10)

e. The small amount of heat they gene-
e is easily removed."

For two years the French National Rail-
ys has been looking into the potentials of
icon rectifiers and has conducted tests
a 5,000-hp a-c locomotive, M. Tessier,
ctrical engineer of the French Railways,
orted. "This unit has given complete
isfaction," he said. "Today we believe
at it is possible to build locomotives with
icon rectifiers. To prove this, we have
dered fifteen 3,600-hp silicon rectifier
omotives of the BB type for freight serv-
. These will be put in service in April.
e French National Railways has also
t into operation stainless-steel commuter
rs equipped with silicon rectifiers. On these
ultiple-unit cars tests are being made of
ree different types of silicon rectifiers."

Mr. Tessier commented on the improve-
ent in adhesion possible with a single
otor on each truck of a locomotive. Gear-
g the axles together, as required by this
rangement has made possible the develop-
ent of rail wheel adhesions higher than
%, and the French National Railways
es a starting adhesion of 30% for these
omotives.

"Epoxy resins have often been presented
the 'miracle' material," I. N. Elbling of
estinghouse Electric Corporation stated
hile discussing the material which has
oved increasingly popular for railway
ectrical applications. "While the electri-
l industry is traditionally skeptical about any 'miracle' material, epoxies have taken a firm and expanding position because of their many unique properties and unique possibilities."

First large-scale use of epoxy resins in the U. S. was by the coatings industry. The electrical industry has made use of epoxy resins in much the same manner. Epoxy coatings have found their place as insulating varnishes, wire coatings, and protective barriers of all types.

The nature of epoxy resins has also lead to their widespread use as encapsulants and potting materials. Dielectric properties of epoxy resins are superior to those of most polyesters and most phenolics. Their 100% reactivity, low-water absorption, high impact strength, low shrinkage, and ease of application make them highly suitable for potting, casting, and encapsulating electrical components. The outstanding adhesion of epoxy resins to glass is responsible for the excellent properties obtained with glass-cloth-epoxy laminates, Mr. Elbling said. Epoxy resin laminates are higher in cost than polyester or phenolics, but their superior properties warrant the additional cost. They have mechanical properties superior to polyesters and their electrical properties are better than phenolics. Water resistance is superior to both polyesters and phenolics.

Third Improved Lubricator Swab Approved

Gustin-Bacon Pc No. 0310 has been added to the AAR Mechanical Division list of hollow-rod packing seals that will replace No. 517342 or BC-8664 seals for new installations or repair maintenance on modern style AB-10 brake cylinder non-pressure heads. This seal is to be considered in the same category as WAB Pc No. 562813 and NYAB Pc No. BC-80041 previously reported to be used, effective January 1, 1961.

TTX Orders 600 Cars; Starts Sixth Year

Trailer Train has ordered, and is receiving deliveries of, 500 85-ft roller-bearing piggyback flat cars from ACF, Bethlehem Steel, General American, and Pullman-Standard at an estimated total cost of $8,100,000. The cars, described as being "of several different but compatible designs," will increase Trailer Train's total fleet to 6,259 units. Trailer Train, which is now beginning its sixth year of operation, has a total membership in the piggyback car pool of 34 railroads and one freight forwarder.

The Norfolk & Western is building at its Roanoke shops 1,000 85-ton coal hopper cars at an estimated cost of $12,000,000. These are in addition to the 1,000 85-ton hopper cars described in the November 1960 issue, page 25. Production is expected to be at the rate of four to eight cars per day.

The Erie-Lackawanna has received 10 piggyback cars built by General American Transportation. The ten G85 cars are designed for operation at speeds of 80 to 85 mph in passenger-train service. Steam and



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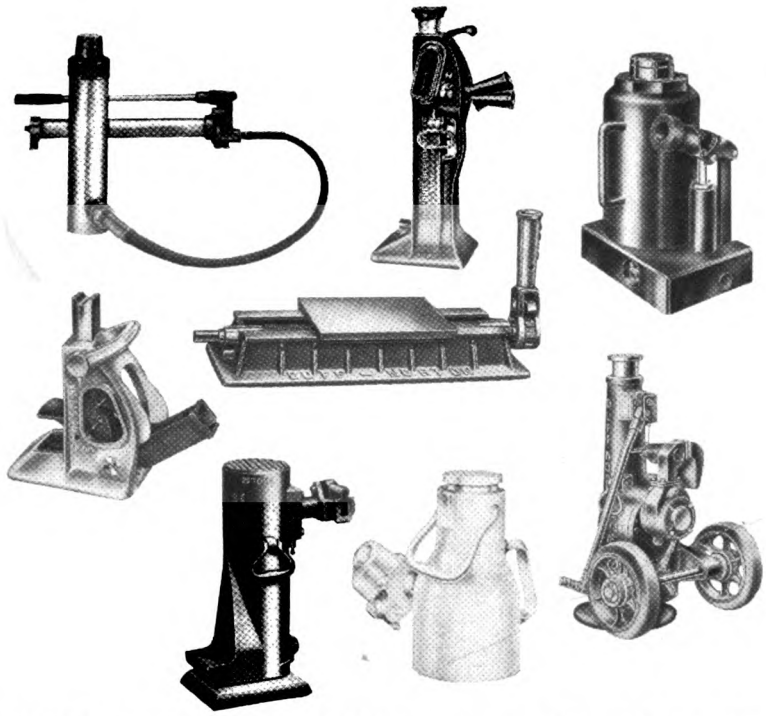
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signal lines are built into the piggyback cars. Cars will handle milk in truck trailers.

The Frisco has ordered 100 70-ton, 50-ft. insulated box cars from ACF. Cars will be equipped with cast-steel underframe ends from General Steel Castings; cushion underframes; lading protection devices, and roller bearings.

The Philadelphia Passenger Service Improvement Corporation, in its capital program for 1961-1962, plans to buy 52 commuter cars at a cost of $11,000,000. The Pennsylvania is slated to receive 36 cars, the Reading, 16. The 26 cars to be ordered in 1961 are budgeted at $6,500,000.

The Toledo, Peoria & Western has ordered for April delivery, one 1,800-hp GP 18 road switcher. This Electro-Motive unit will replace one 1,500-hp F 3 unit.

Personal Mention

Canadian National.—Five regions established under revised organizational structure—Atlantic (Moncton, N.B.); St. Lawrence (Montreal, Que.); Great Lakes (Toronto, Ont.); Prairie (Winnipeg, Man.), and Mountain (Edmonton, Alta.)—subdivided into administrative units to be known as areas. Regional and area appointments as follows: ATLANTIC REGION, *Maritime Area:* DAVID A. FOSTER, superintendent of equipment. *Chaleur Area* (Campbellton, N.B.): THOMAS F. HOYT, superintendent of equipment. Formerly master mechanic, Campbellton division. J. W. GILLIS, assistant superintendent of equipment. Formerly car foreman at Edmonton. GREAT LAKES REGION: W. D. PIGGOTT, general superintendent equipment; G. L. GALLOWAY, assistant general superintendent equipment; J. J. HARRIS, special assistant (car equipment); F. W. BROUGHTON, mechanical and electrical engineer; A. R. TURNER, supervisor motive power; A. E. TAYLOR, supervisor car equipment. *Toronto Area:* R. M. VEENIS, superintendent of equipment; W. D. ROSS, assistant superintendent equipment; D. YOUNG, diesel supervisor; W. D. PHILLIPS, electrical supervisor; F. A. PETERS, apprentice instructor. *London Area:* (London, Ont.): R. J. CRUX, superintendent of equipment; C. YOUNG, assistant superintendent equipment; E. SUSSENS, electrical supervisor. *Northern Ontario Area* (Capreol, Ont.): R. BABB, superintendent equipment; K. G. LUSK, traveling car foreman; G. C. FULCHER, electrical supervisor. ST. LAWRENCE REGION: K. E. HUNT appointed general superintendent equipment, succeeding W. D. PIGGOTT. *Quebec Area:* M. HUNEAULT, superintendent equipment; L. P. TROTIER, assistant superintendent equipment; H. S. MCTEER, general foreman motive power; J. B. PARADIS, diesel supervisor; R. A. MANICOM, electrical supervisor; J. H. VACHON, assistant electrical supervisor; J. L. PAGE, apprentice instructor; J. R. DELISLE, traveling car foreman; J. E. SAUVE, boiler inspector. PRAIRIE REGION. N. D. COWAN, general superintendent of equipment. *Transcona, Man.:* J. W. JACKSON appointed superintendent of

shops, succeeding Mr. Cowan. J. SUTHERLAND appointed supervisor of cars. Formerly superintendent Fort Rouge, car shops.

esapeake & Ohio. — *Cleveland, Ohio:* RGEI G. GUINS appointed assistant director of research. *Richmond, Va.:* W. S. BURWELL appointed master mechanic, chmond Division. Position of general eman locomotive department abolished. *ssell, Ky.:* L. S. FIDLER appointed master chanic, succeeding Mr. Burwell. *Peru, l.:* F. H. PORTER appointed general foreman, succeeding Mr. Fidler.

w York Central.—*Detroit, Mich.:* FLOYD DUBAY appointed superintendent maintenance—special car equipment.

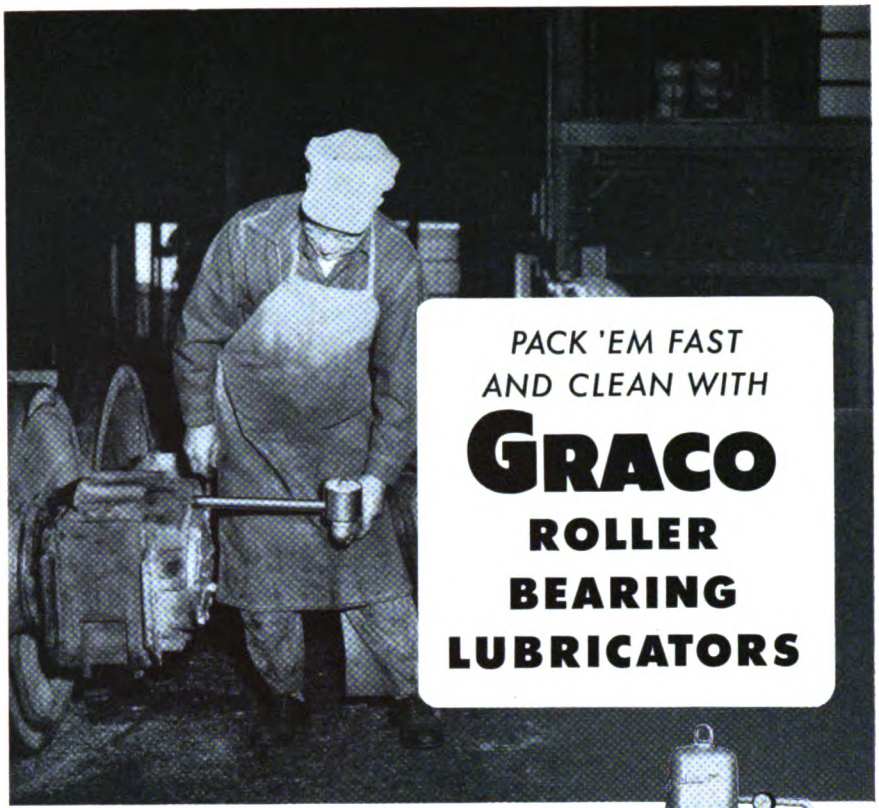
rfolk & Western.—*Roanoke, Va.:* JAMES HANCOCK, shop inspector, appointed mechanical inspector. J. L. OAKEY appointed r foreman, Shaffers Crossing, succeeding A. HENSLEY, SR., retired. ALBERT W. ANOR appointed assistant car foreman, affers Crossing, succeeding Mr. Oakey. *mberts Point, Va.:* RAY W. SWANSON appointed gang foreman, succeeding Mr. anor. *Portsmouth, Ohio:* LEO F. DEBO pointed assistant foreman, locomotive dertment. CARL C. RUTH, foreman electrician, appointed assistant enginehouse foreman, succeeding S. E. WALDIS, retired.

nnsylvania.—*Chicago:* H. W. WITTMAN appointed master mechanic, Northwestern gion. *Thorndale, Pa.:* L. E. OZBUN appointed assistant road foreman of engines. *arrisburg, Pa.:* W. D. VOLKMER appointed otive power inspector.

uthern Pacific. — Mechanical Department eadquarters reorganized, functions being vided between Maintenance-Operations id Engineering-Planning as follows. *San rancisco, Cal.:* N. L. MCCRACKEN named head Maintenance-Operations section. . E. RUSSELL in charge of Engineering-lanning section. Assisting Mr. Russell: . V. GARIN, manager, Mechanical Engineering and Research, and R. E. HARRISON, anager, Maintenance Planning and Control. Assisting Mr. Garin: F. KURZ and A. . PEDRICK, research and development; F. EIPER, assistant manager, maintenance ngineering and quality control; D. R. ALLERI, assistant manager, engineering and esign; F. H. STENGLE, assistant manager, ndustrial engineering; N. A. PASSUR, engineer, car design and construction, and A. . NEWELL, assistant to manager, mechanical engineering and research. *San Francisco:* G. F. PATTON appointed mechanical cheduler; L. S. BOYD, diesel engineer, and V. L. PREECE and M. R. GADDIS, traveling iesel supervisors. *Los Angeles:* J. W. ONAN appointed assistant superintendent, nechanical department, and A. C. GROVER, nechanical production planner. *Ogden, Utah:* C. B. FISH appointed master car repairer, Salt Lake Division. *Sacramento, Calif.:* L. P. OBERKAMP appointed superintendent of shops, succeeding G. M. CAGLEY, retired. H. J. HITKE named assistant superintendent of shops (car). C. F. URSCH named industrial engineer.

OBITUARY

J. W. **Atkinson**, retired mechanical superintendent, Santa Fe, Shopton, Iowa, died December 3 at Mission, Kan.



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Supply Trade Notes



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AMERICAN BRAKE SHOE CO.—*Raymond A. Frick*, a vice-president, Railroad Products Division, appointed executive vice president of the division.

■

ELECTRO-MOTIVE DIV., GENERAL MOTORS.—*F. D. Lapham* appointed general administrative manager. Mr. Lapham formerly director of production control and purchasing.

■

AMERICAN STEEL FOUNDRIES.—*Ralph D. Brizzolara*, vice-president, retired; *E. A. Walcher, Jr.*, vice-president—manufacturing, Transportation Equipment Division, promoted to new position, with responsibility for coordination of research, product engineering, manufacturing, and sales activities.

■

MAGNUS CHEMICAL CO.—*Peter Canlanotto* appointed chemical and sales engineer.

■

AIR REDUCTION SALES CO., A DIVISION OF AIR REDUCTION CO.,—*J.W. Cunningham* appointed manager district sales office in Pittsburgh, Pa. *J. P. Casalis, Jr.*, appointed district manager, St. Louis district.

■

GENERAL ELECTRIC CO.—*Joseph T. Bailey* appointed manager, Locomotive Section, Locomotive & Car Equipment Dept., Erie, Pa. *Frank A. Compton, Jr.*, named to newly created post of manager of locomotive engineering. *W. Speicher* named manager of Locomotive engine subsection, succeeding *J. C. Rhoads*, deceased.

■

M & J DIESEL FILTER CORP. —*L. E. Gunther* appointed eastern representative with headquarters in Richmond, Va.

■

UNITY RAILWAY SUPPLY CO. — *M. H. Frank* of Mel H. Frank Co., Cleveland, named sales representative, Cleveland area. *L. E. Gunther* appointed representative in Richmond, Va.

■

VASCOLOY-RAMET CORP.—*Grid Sales, Inc.*, Baltimore, Md., and *W. R. McQuaid, Jr.*, of Jacksonville, Fl., appointed sales agents for railroad tooling.

■

SKF INDUSTRIES, INC.—SKF has acquired under a long-term lease a newly completed plant in Asheville, N. C., for the production and sales of Expediter railroad bearing.

lip Suppressing

(Continued from page 35)

wer than on units which are not ɔping. Under such circumstances, : operator, guided by experience, ɔuld reduce power slowly. As soon the slip indication ceases, the throt- should be opened to increase power track conditions permit.

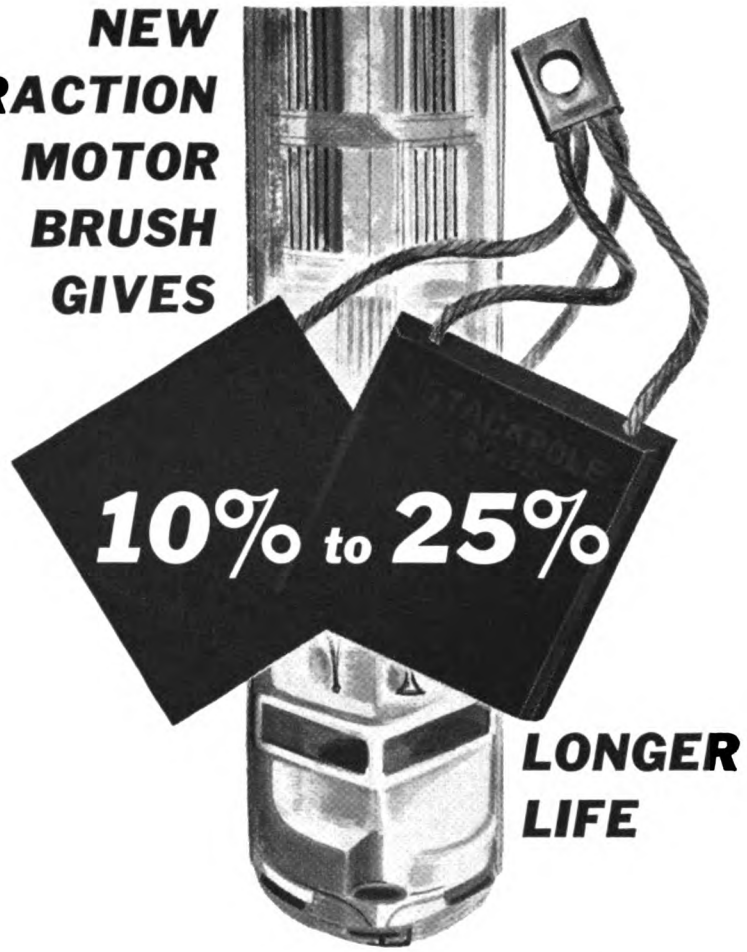
It is considered preferable to in- ıte an application of the slip sup- :ssing brake on all axles of the unit ıen only one axle is slipping. When e axle slips, the power it loses is ınsferred to the axles that are not ɔping. Their tractive effort and ıdency to slip are increased. Be- use engine output tends to remain nstant as a result of load control ac- ɔn, application of the slip suppressing ake to all the axles tends to prevent : slipping of those axles on which e tractive effort increases while si- ultaneously reducing the speed of e slipping axle.

A slippery film may develop on the comotive drivers as well as on the il (RL&C, May 1960, p 32). Rail lhesion is spotty, and the film on e wheels may sustain slipping from ıe slippery spot to the next. The ac- ɔn of the slip suppressing brake in :stroying the film and cleaning all the heel treads at the same time that it is :inging the slipping axle into normal ɔlling contact with the rail can re- ore full pulling power between slip- ery spots and facilitate getting the ain over the railroad in minimum me. It is simpler to actuate the slip ıppressing brake on all the axles when slip is detected than it would be to y to single out and apply the brake ɔ the axle which might be slipping at ıat instant. The simplest arrangement roduces the most satisfactory result.

Wheel slips can be detected and cor- ected without drastically disturbing r upsetting the electric transmission ystem or the engine governing system f the locomotive. This minimizes the ɔssibility of recurring slips resulting rom the way power is reapplied, thus nsuring that locomotive output can be naintained to keep the train up to peed.

The slip suppressing brake is effec- ive at any locomotive speed. More- ɔver, contrasted with sand, it is al- ways effective where it is wanted. Difficulty is often experienced in keep- ng sand on the rail at low speed. At ıigh speed, this may become practi- :ally impossible.

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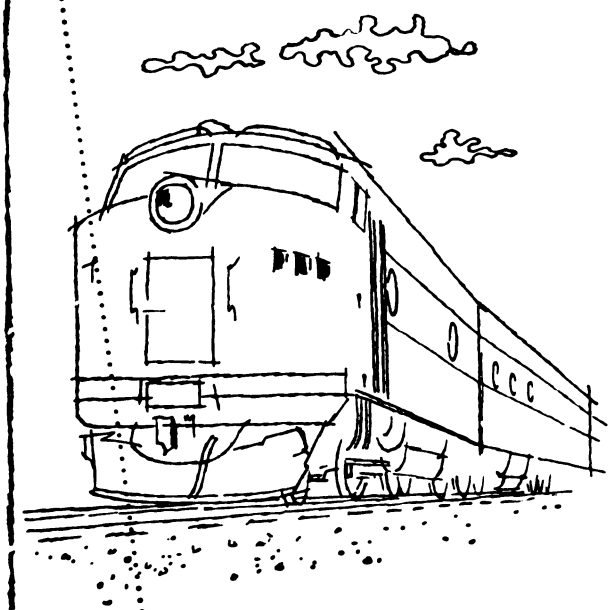
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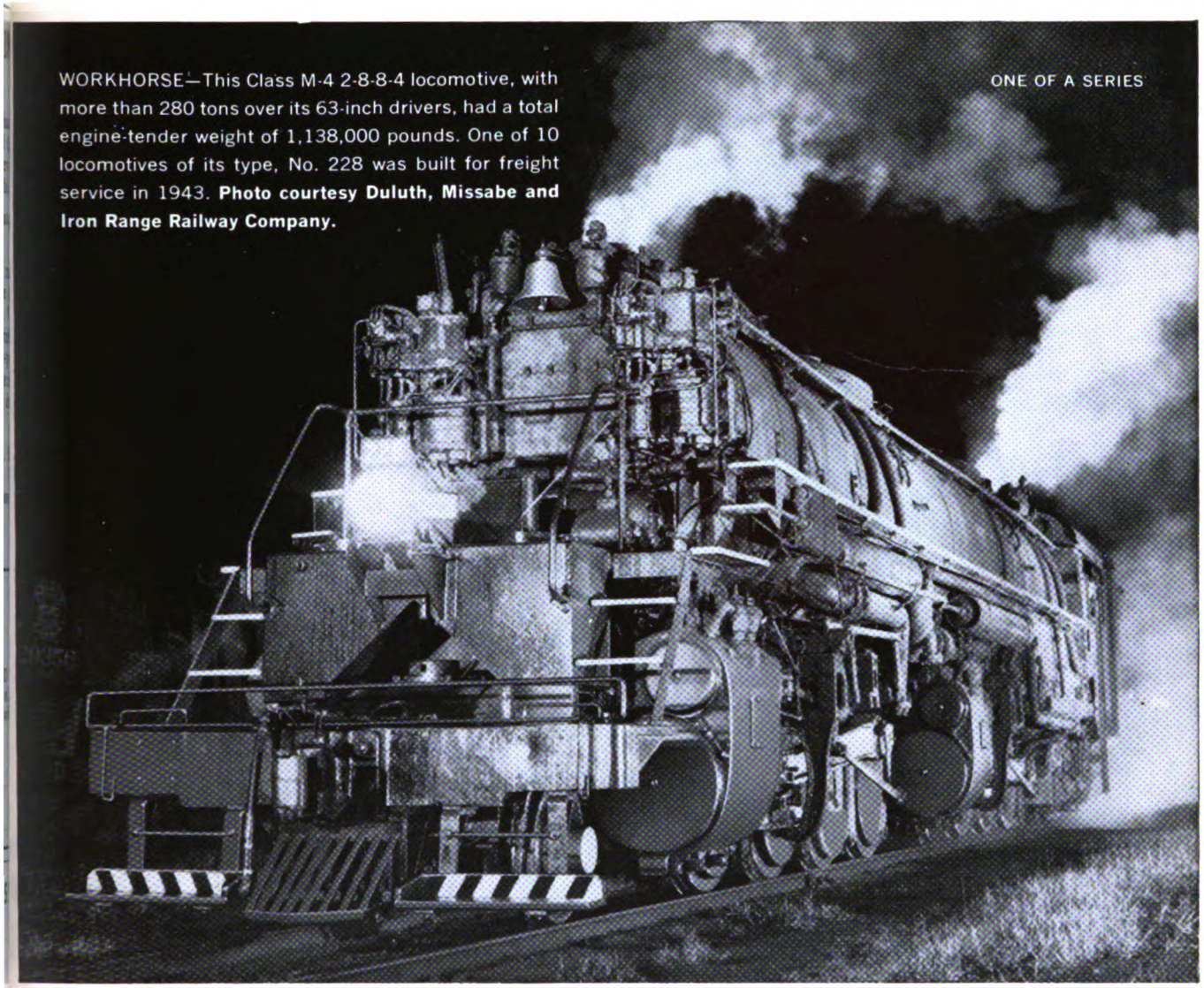
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WORKHORSE—This Class M-4 2-8-8-4 locomotive, with more than 280 tons over its 63-inch drivers, had a total engine-tender weight of 1,138,000 pounds. One of 10 locomotives of its type, No. 228 was built for freight service in 1943. **Photo courtesy Duluth, Missabe and Iron Range Railway Company.**

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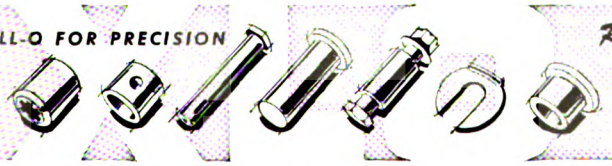
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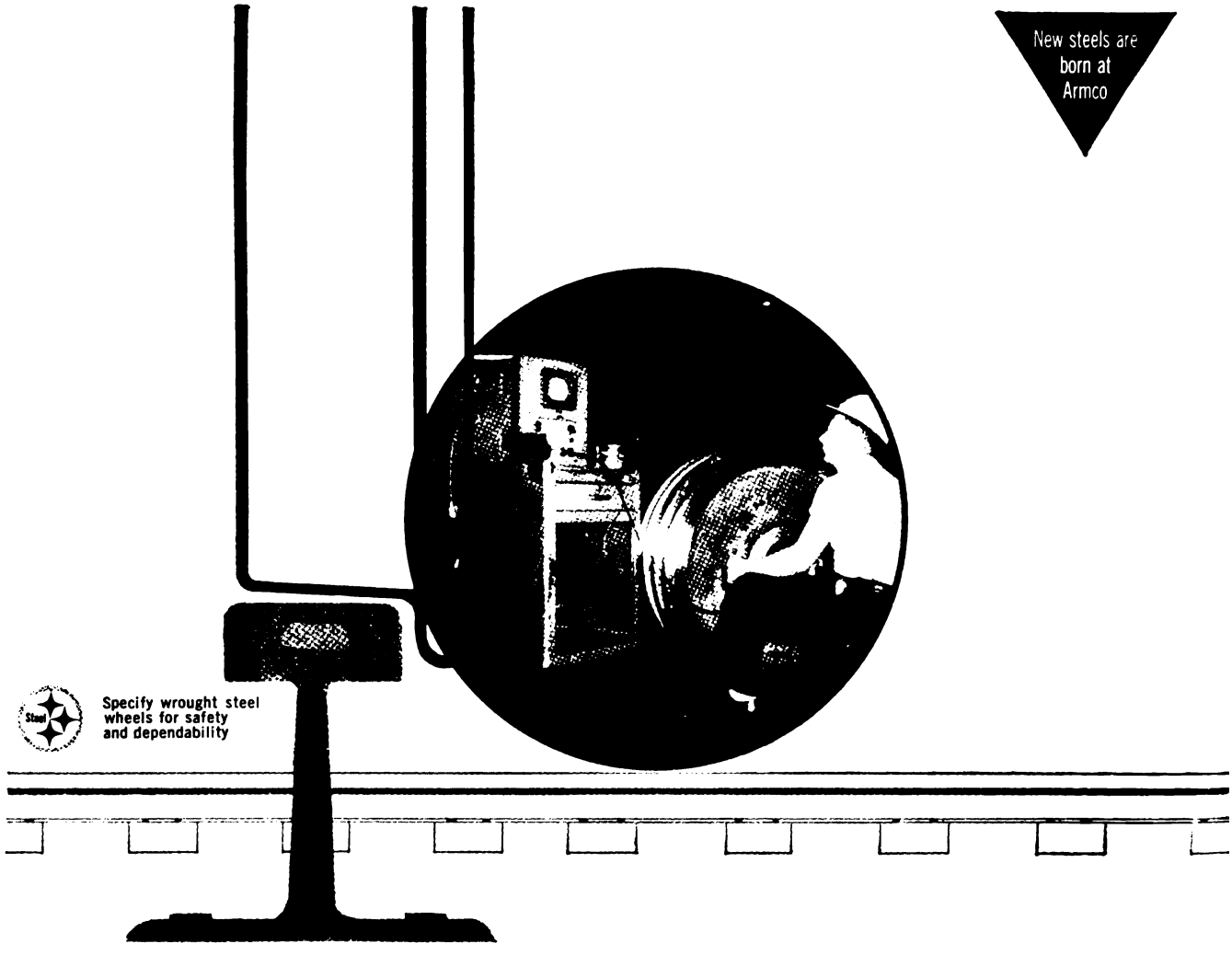
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REPORT FOR APRIL

LMOA Program Stresses Savings in Maintenance

The Locomotive Maintenance Officers' Association is stressing how to do a better locomotive maintenance job at less cost in all its 1961 work. At a meeting of its executive committee members and technical committee chairman on March 7, LMOA President O. L. Hope, assistant chief mechanical officer, Missouri Pacific, emphasized that all reports to be presented this year must be specific in showing how economies in maintenance work can be achieved.

A unique system is to be used by the LMOA to improve the quality of all reports to be presented at its September annual meeting. It has a pre-convention program by which it presents all reports prior to the September meeting through the cooperation of local diesel clubs. Each of its eight 1961 reports will be the feature at a regular monthly meeting of a different diesel club. The local clubs get the advantage of a high-quality report prepared by outstanding maintenance officers; the LMOA gets help, through discussions from the floor, in making a good report even better.

The Fuel and Lube Oil report was presented by C. A. Wilson, general supervisor diesel engines, AT&SF, before the Chicago Railroad Diesel Club on March 7. Other reports will be presented by LMOA technical committee chairmen as follows:

April 4. Great Lakes Railway Diesel Club (Cleveland)—New Developments in Motive Power, C. P. Turner, system supervisor, diesel operation and maintenance, LV.

April 11. Southeastern Railway Diesel Club (Richmond)—New Simplified Controls for Steam Generators and Steam Generator Turbo-Tube Performance, J. J. Dwyer, chief chemist, C&O.

April 12. Louisville Diesel Club—Shop Equipment (spot systems), S. C. Snow, superintendent motive power, L&N.



O. L. Hope
President, LMOA

April 20. Southwestern Railway Diesel Club (Houston)—New Economical Methods that Improve Service Life of Diesel Engines, K. Pruchnicki, supervisor locomotive maintenance, T&NO.

April 24. Mile High Diesel Club (Denver, Colo.)—New Ideas in Maintenance and Rebuilding of Traction Motors and Main Generators and Upgrading Control Equipment, C. J. Frey, electrical department foreman, Rock Island.

May 1. St. Louis Railroad Diesel Club—Effect of New Type Brake Shoes on Locomotive Maintenance and Operation, E. Milkert, assistant to superintendent motive power, Alton & Southern.

May 17. Mid South Air Brake & Diesel Club (Memphis, Tenn.)—Diesel Material Reconditioning and Control, K. L. Pollitte, manager system assembly shops, Southern.

TIME SAVING IDEAS FOR APRIL

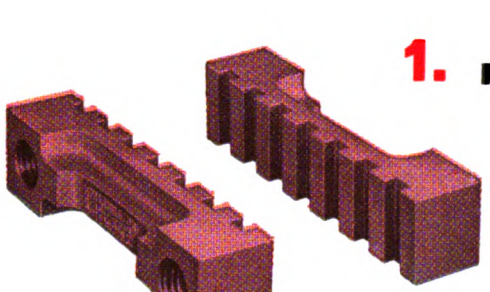
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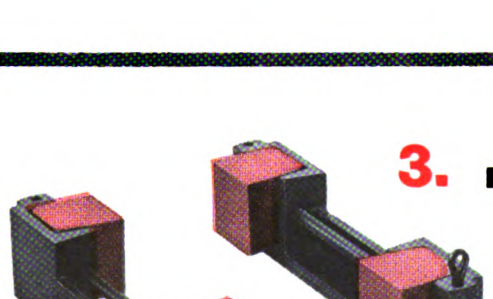
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Provide maximum stabilization of the entire journal box assembly—increase miles per hot box ten times



2. MAGNUS FLAT-BACK SOLID BEARINGS

Wider, non-tilting design limits bearing displacement—provides effective stabilization at lower cost



3. MAGSTOPS

Offer the inherent advantages of R-S Journal Stops in a low-cost, rugged, fabricated design

THE NEXT big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

JOURNALS—

yet BETTER BEARING PERFORMANCE

Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures —increase miles per hot box *ten times;* miles per cut journal, *fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.

Journal Stops give the low-cost solid bearing a chance to work at optimum efficiency, not just part of the time, but *all* of the time! They can be easily installed on any freight car, new or old. And they increase new car costs less than 2%—*pay for themselves* in less than 3 years!

Wear on R-S Journal Stops is slight, and Stops can be re-shimmed should wear become excessive. The Stops should last the life of the side frame.

The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust guard, tends to prevent spread linings in the bearings.

The flat-back bearing is also manufactured to "pre-war length," increasing resistance to impact and wear at both collar and fillet ends. Its greater mass and weight result in a more *rugged* bearing with inherently greater life expectancy.

Magnus flat-back bearings are interchangeable with any standard raised-back bearing, simply by using a flat-bottomed wedge. Bearing dimensions, in each size, are the maximum which can be easily installed in the journal box through the standard lid opening.

Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The big advantage of the MAGSTOP is low-cost installation that can be accomplished quickly whenever side frames are removed for any reason. The bronze inserts provide ample bearing area and can easily be replaced, if required, without shopping the car.

By limiting journal movement within the box, MAGSTOPS greatly increase bearing life, protect against dust-guard damage, prevent loss and contamination of lubricant. They reduce wheel flange wear, too.

MAGNUS METAL CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

AIEE Land Transportation Committee RR Conference

The Land Transportation Committee of the AIEE, in conjunction with the AIEE Cleveland Section, is scheduling a two-day "Automation and Computer" Railroad Conference in Cleveland, June 6 and 7.

This Cleveland meeting is a substitute for the cancelled April meeting which was to have been sponsored by the Railroad Division of the ASME and the LTC at San Francisco.

Equipment Orders Still Lagging

The *Boston & Maine* has ordered six 1,800-hp GP18 road switchers from EMD for May delivery. Cost $1,036,000.

The *Delaware & Hudson* has purchased six 1,800-hp diesel-electrics from Alco to replace 1,500-hp units that are being retired.

One of the new 16-cylinder, 2,400-bhp diesel-electric locomotives, designed and built by Alco (RL&C, Feb. 1960, p 17), is now in service on the *Green Bay & Western* moving priority freight between Kewaunee, Wis., and Winona, Minn. The locomotive is geared for 65 mph.

The directors of the *Louisville & Nashville* have authorized the expenditure of $454,000 for the purchase of additional equipment for shipment of automobiles. L&N will acquire 50 tri-level and 10 bi-level racks for installation on (TTX) piggyback flat cars.

The acquisition of 100 new commuter cars, at an estimated cost of $20,000,000, is planned by the *New Haven*. Stockholders are being asked to approve purchase of 50 cars through the sale of equipment trust certificates or other financing, and lease of 50 cars from Port of New York Authority under New York State's commuter-aid program.

The Port of New York Authority is receiving bids for "some 50" new commuter cars for use by the *New York Central*. The electric-powered, air-conditioned coaches, to be leased to the NYC, are expected to be in service early in 1962.

The *Pennsylvania* will rehabilitate 2,019 cars and repair 6,440 others during 1961 at an estimated cost of $7,500,000. All work will be done at Hollidaysburg, Pa., shop. The rehabilitation program ($5,000,000) includes 1,000 hopper cars, 595 box cars, 100 covered-hopper cars, 60 gondolas carrying containers, 54 double-deck livestock cars, and 210 cabooses. The repair program ($2,500,000) will include mostly hopper and box cars, with some gondolas and flats. Earlier plans called for building 3,529 new cars at a cost of $29,000,000 (RL&C, Dec. 1960, p 8).

High Wheel Loads Increase Rail Damage

Multiple-unit freight cars equal in capacity to the 90- and 100-ton freight cars which have recently been introduced might produce significant reductions in track maintenance costs, according to G. M. Magee, director of engineering research, AAR. Writing in *Railway Age*, Mr. Magee estimates that maintenance-of-way costs for one 100-ton carload would average $41.10 as compared to $27.90 for a similar "carload" moved in a multiple-unit combination of two 50-ton cars.

Avergae wheel loads of freight cars have been increasing for years. From 1921 to 1959, average capacity increased from 42.5 tons to 55 tons, or 30%. Railway maintenance engineers have been aware for several years of the effect that the increasing wheel loads are having upon the rail, Mr. Magee reports. The larger rail in main track today is generally quite capable of supporting the increasing wheel loads insofar as flexural stresses are concerned.

Critical stresses in rail today are those associated with the contact pressures of the wheel on the rail. In the longitudinal vertical plane, the rail surface is straight and the wheel has a diameter of 33 in. In the transverse vertical plane, the rail wears to a radius of 10 in. and the wheel tread hollows to a radius of about 17 in. Actual contact area of the wheel on top of the rail is an ellipse about ¾ in. wide and ⅝ in. long. This small area must withstand the entire wheel load, and its size is not affected by increased rail size.

The contact surfaces are subjected to high compressive stress from the wheel load, resulting in variable internal compression, tension, and shearing stresses within the head—stresses conducive to the development of progressive or fatigue failures. Almost 80% of the 12,353 rail failures occurring in the past ten years' rollings of control-cooled rail were the result of the contact pressure of the wheel on the rail.

While increasing the strength of rail steel would help, present rail steel is already as strong as can be obtained without heat treatment. Cost of heat treatment—approximately $65 per ton—when added to the cost of $115 per ton for rail, makes this uneconomical, except for sharp curves carrying heavy traffic, according to Mr. Magee. With railroads annually replacing only about 5,000 track-miles with new rail, it would take 50 years to get all main-line track relaid with heat-treated rail. While Mr. Magee knows of no change which could be made in the contour of the rail head to alleviate high contact pressures, it would require the same interval to place such rail in service if it were to be developed.

The wheel situation is different. With heavier cars, it is practical to utilize heat-treated wheels that are capable of withstanding the contact pressures developed. However, some wheel loads now being considered are even beyond what the manufacturers consider can be carried on heat-treated wheels without shelling.

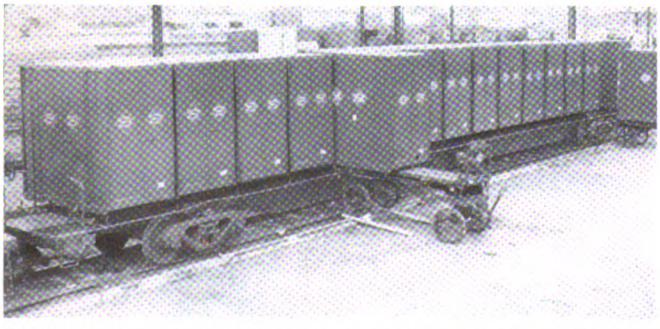
There are only two practical alternatives for keeping the contact pressures of the wheel on the rail within limits that can be tolerated by the rail without damage or shortened life. One is control of the wheel load and the other is control of the wheel diameter. Theoretical and photo-elasticity studies show that internal stresses resulting

(Continued on page 45)

HOT-BOX STATISTICS

	Cars set off between terminals with hot boxes	Miles per car set off
1955	142,051	242,233
1956	169,286	209,479
1957	187,036	182,435
1958	156,470	200,417
1959	157,471	202,390

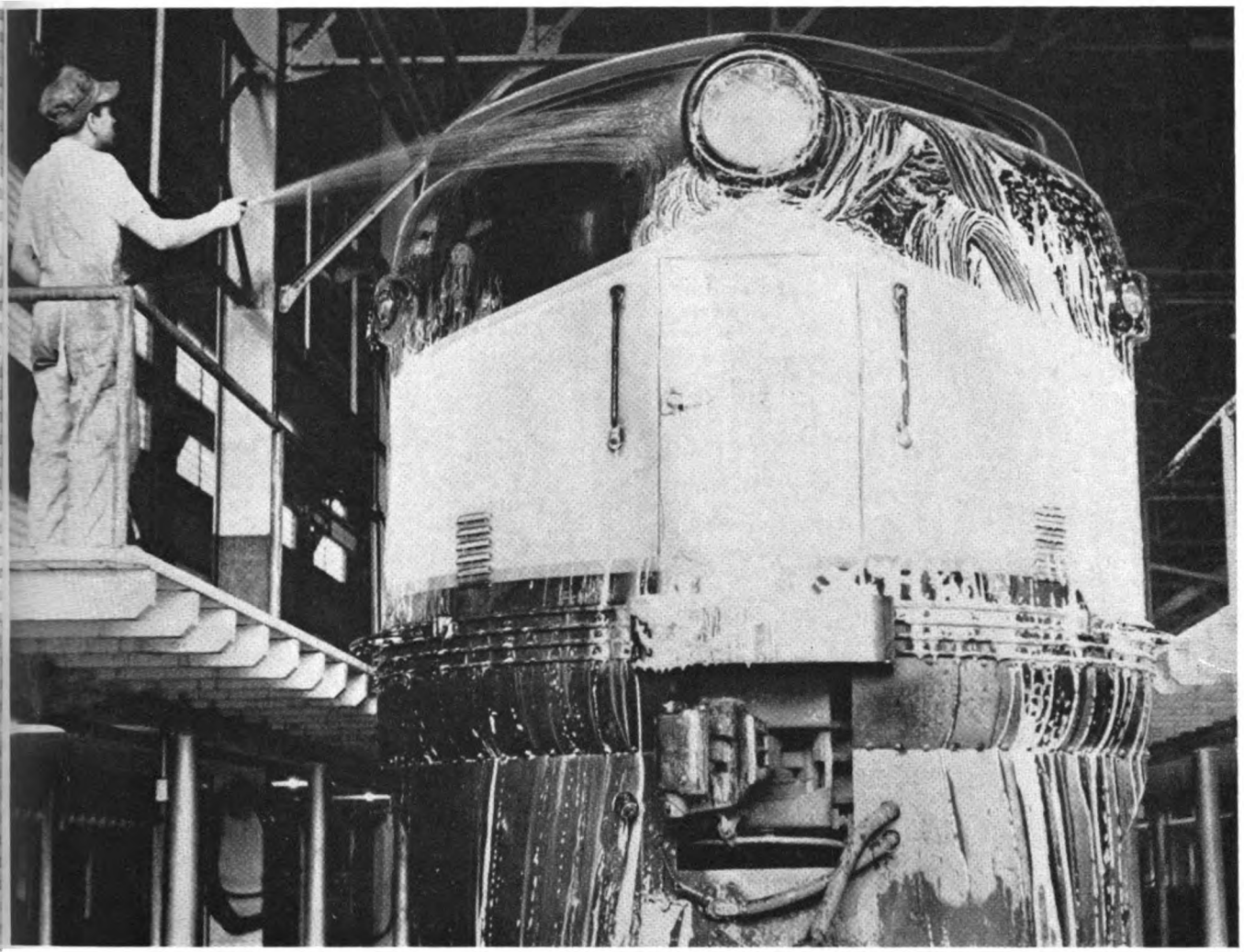
1960	Pads	Waste	
Jan.	2,329	5,887	324,954
Feb.	2,261	5,549	323,155
March	2,566	7,429	274,195
April	1,900	10,296	223,494
May	1,846	11,212	213,342
June	1,795	14,934	159,354
July	1,945	16,540	136,076
August	2,140	15,120	150,362
Sept.	2,142	12,132	173,549
Oct.	2,146	7,373	286,604
Nov.	2,083	3,557	439,965
Dec.	2,314	3,201	441,394
Total	25,467	113,230	225,975





Reduced handling costs and some reductions in duration of station stops may result from two container car experiments which are under way on the passenger trains of two railroads. Containerized express shipments are being handled between New York and St. Louis by the Pennsylvania on cars developed to handle REA Express containers (left). The Frisco is moving both mail and express on its "Will Rogers" between St. Louis and Oklahoma City in containers which move on Trailer-Train car (right) that has been fitted with container hold-down gear and steam line.

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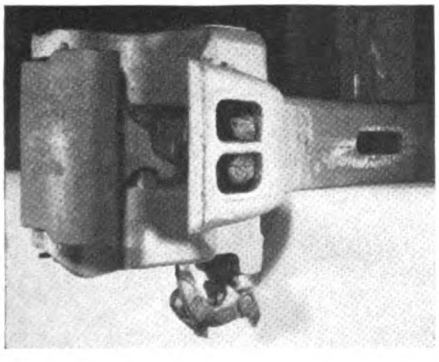
SCIENCE

years' leadership in industrial cleaning



Hand Brake

The new Klasing non-spin vertical wheel hand brake features a sealed roller bearing for the wheel shaft and sealed-in life-long lubrication of all working parts. The brake is packed with No. 2 lithium grease. Other features include SAE 1045 forged-steel components, a pressed-steel hand wheel, and a zinc-plated chain for increased corrosion resistance. The device is said to exert equal power at all stages of piston travel and to provide powerful, uniform braking with minimum effort. Full release of the brake is accomplished by two counterclockwise turns of wheel. AAR Certificate No. 36 has been assigned. *Klasing Hand Brake Co., Dept. RLC, 20 Henderson st., Joliet, Ill.*



Couplers of High-Tensile Steel

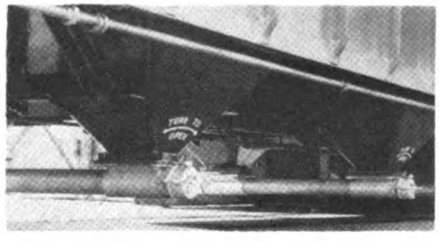
The Type E freight-car coupler is now being produced in McConaloy, a high-tensile, nickel-chrome-moly steel developed by McConway & Torley. In addition to high-tensile and high-yield characteristics, these couplers, it is said, will withstand greater impact; remain operational even under the most severe climatic conditions, and reduce equipment maintenance costs. *McConway & Torley Corp., a division of Elliott Machine Corp. of Baltimore, Dept. RLC, Pittsburgh 1, Pa.*

Freight-Car Liners

Tests in actual service are said to show that contamination resulting from the shipment of raw hides can be eliminated through the use of liners fabricated from special laminated paper. Clean-up is accomplished by removing and destroying the liner which covers car floor and walls to a height of 54 in. Because no salt is needed, cost and deadweight are also reduced. *Kennedy Car Liner & Bag Co., Dept. RLC, Shelbyville, Ind.*

Hopper-Car Adhesive

Polystix, an adhesive unaffected by -20 to 250 deg F temperatures, permits handling finely ground products without expensive clean-up when product cakes on container walls. Brushed around interior edges, it forms a pressure-sensitive area to which polyethylene film will adhere. Polyethylene sheets can be stripped and new layers applied on same Polystix coating. *Adhesive Products Corp., Dept. RA, 1600 Boone ave., New York.*



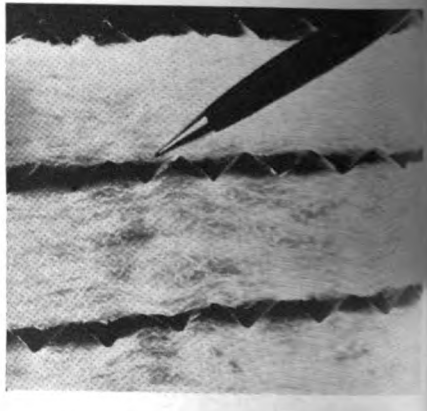
Unloading Nozzle

An entire car can be unloaded with three connections from double-ended nozzles on opposite hoppers. The nozzles are designed for suction unloading from either side of car, and product flow is controlled by a GATC design rotary valve. The rate of flow is regulated by manual rotation of the valve. In transit, air-tight nozzle caps provide weather-tight protection when properly secured. *General American Transportation Corp., Dept. RLC, 135 S. La Salle st., Chicago 90.*

Safety Press Block

Saf-T-Bloc is a device developed to assure maximum support of power presses during die servicing operations. It replaces old style steel blocks and wood wedges and is used for rapid snubbing of upper and lower dies while cleaning, changing, or shapening dies, or performing other maintenance tasks on the presses. The device, a modified version of the bell base screw jack, consists of three parts. A single base casting with integral handle houses a steel screw. The top of the screw is knurled for easy hand adjustments while on the press. A stop washer at the base of the screw prevents raising beyond safe limits. The unit weighs approximately 11 lb and is available in various capacities and raises. It is attached to the press with a short length of chain and a safety plug. Once the plug is removed from its position in the power control panel, all power to the press is automatically cut off. *Duff-Norton Jack Div., Duff-Norton Co., Dept. RLC, Gateway Four, Pittsburgh 22, Pa.*

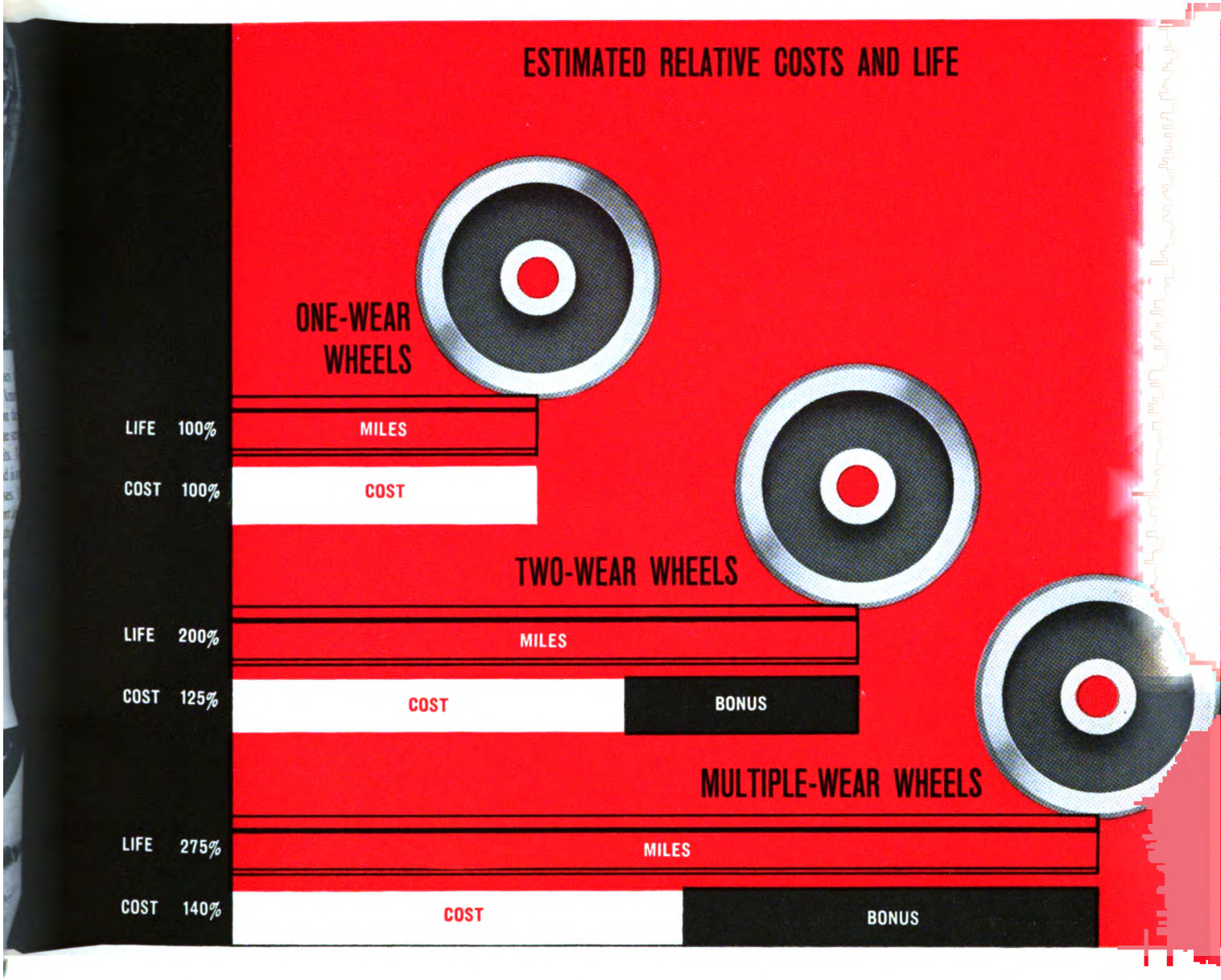


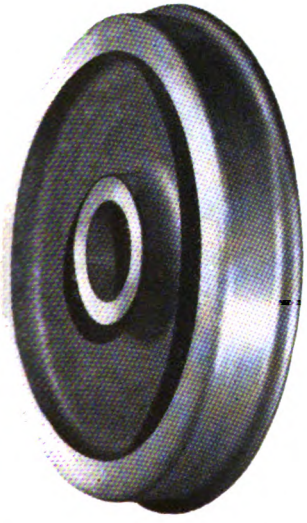


Reefer Insulation

Isoflex-k20 insulation consists of multiple laminated layers of vinyl-coated corrugated aluminum foil and glass fiber spacers. The vinyl protects the foil from oxidation and corrosion, thus maintaining a high degree of reflectivity. It also acts as an adhesive in the laminating process. In addition to its thermal efficiency, the insulation is said to remain resilient, non-combustible, and dimensionally stable under temperature extremes, and not to sag or collapse when subjected to vibration or other stresses. *Union Carbide Plastics Co., Div. of Union Carbide Corp., Dept. RLC, 270 Park ave., New York 17.*

How to *reduce* wheel costs





EDGEWATER TWO-WEAR AND MULTIPLE-WEAR

rolled steel wheels

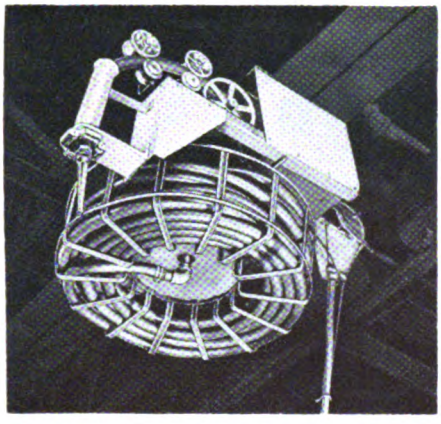
Not only do Edgewater rolled-steel wheels provide a substantial per-mile cost saving, but also an extra measure of safety They are made on the world's most powerful circular rolling mill. The Edgewater process produces wheels that are tough and hard – give long life under heavy loads and high speeds.

If you are looking for savings, here's a good place to start!

EDGEWATER STEEL COMPANY

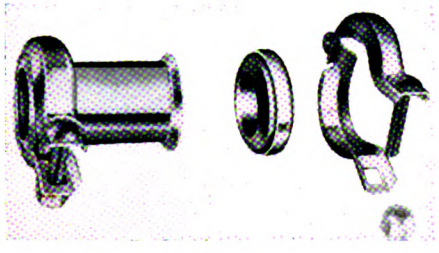
P.O. Box 478, Pittsburgh 30, Penna.

WHAT'S NEW IN EQUIPMENT—*(Continued from page 10)*



Electric-Powered Hose Reel

The vertical spindle in the Zierco electric powered hose reel makes possible a gravity hose coiling system which eliminates kinks and tight coiling which cause hazardous snaking on payed-out hose. Six aluminum rollers pay-out and take-up hose at a rate of 100 fpm. The reel can be wall or ceiling mounted. Capacities range from 50 to 500 ft, depending upon hose size. *Zierden Co., Dept. RLC, 3815 S. Kinnickinnic ave., Milwaukee 7, Wis.*

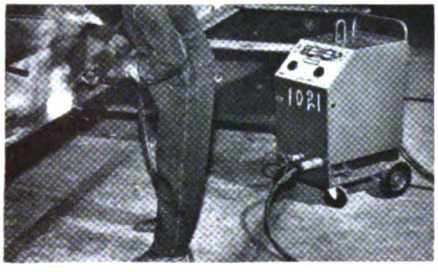


Pipe Coupling

The improved Flexmaster pipe coupling is available in sizes from ⅜ to 4 in. and in lengths from 2 in. through 36 in. Its gasket is fully contained in the gasket retainer to assure uniform pressure of the gasket against the pipe and sleeve. The coupling meets ASA requirements for 150 psi service with temperatures from minus 40 deg F to plus 250 deg F. Special gaskets for higher temperatures may also be obtained. *Marman Division, Aeroquip Corp., Dept. RLC, 11214 Exposition Blvd., Los Angeles 64, Calif.*

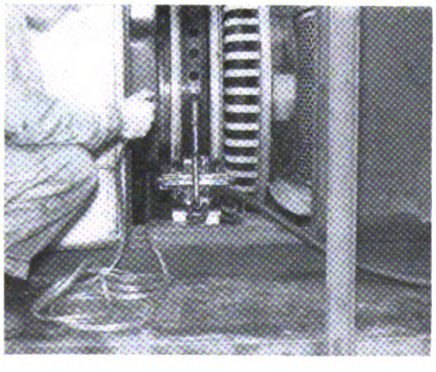
Safety Solvent

Turco-Solv has been designed for in-place-spray-cleaning of motors, generators, switches, control panels, rheostats, and other electrical equipment. Controlled evaporation is said to allow the solvent to stay wet and working long enough to clean thoroughly in a minimum of time. Solvent vapors in the air are also greatly reduced, minimizing, toxicity and flammability. No hand-wiping, rinsing, or further chemical processing is needed. The solvent is non-corrosive and non-conductive and can be used on all metals, paint and varnish. *Turco Products, Inc., Dept. RLC, 24600 S. Main st., Wilmington, Calif.*



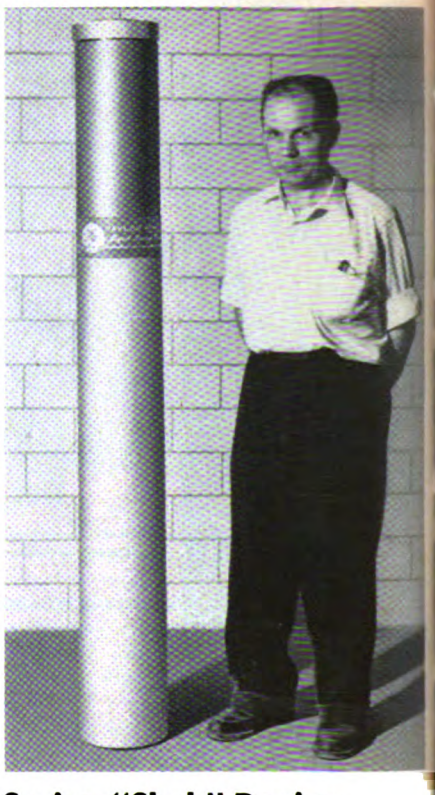
Semi-Automatic Production Welder

The Innershield Squirt Welder, for use both on machinery and structural fabricating, continuously feeds a tubular, self-shielding electrode through a 24-oz welding gun that is manually supported and guided along the joint being welded. A d-c motor generator supplies power for the welding range of 350 to 600 amp. Standard welding gun cable length is 15 ft. *Lincoln Electric Co., Dept. RLC, Cleveland 17, Ohio.*



Diesel Engine Barring Device

The pneumatic Power Bar permits one man to bar an engine over for inspection of rings, pistons, cylinder liners or for re-set timing. The device fits in the cradle used for manual barring and operates on 80 psi shop air. Inching control is provided for accurate timing. The unit also facilitates work on generators. *Circuit Engineering, Inc., Dept. RA, 1565 San Marco blvd., Jacksonville 7, Fla.*



Spring "Shok" Device

The Model L 177232-36 Liquid Spring Shok is designed for a full stop, without impact, of a fully loaded freight car or missile rail car operating at up to 12 mph. The compressibility of the all-liquid content (3.83 gal) eliminates the use of gas or air, providing full damping. At 18-in. travel, rated energy absorption is 460,000 ft-lb. Preload spring force is 16,000 lb, with an end load of 32,000 lb for restoring position. Volume is 861 cu. in. *Taylor Devices, Inc., Dept. RLC, 200 Michigan ave., North Tonawanda, N. Y.*



Diesel-Powered Trackmobile

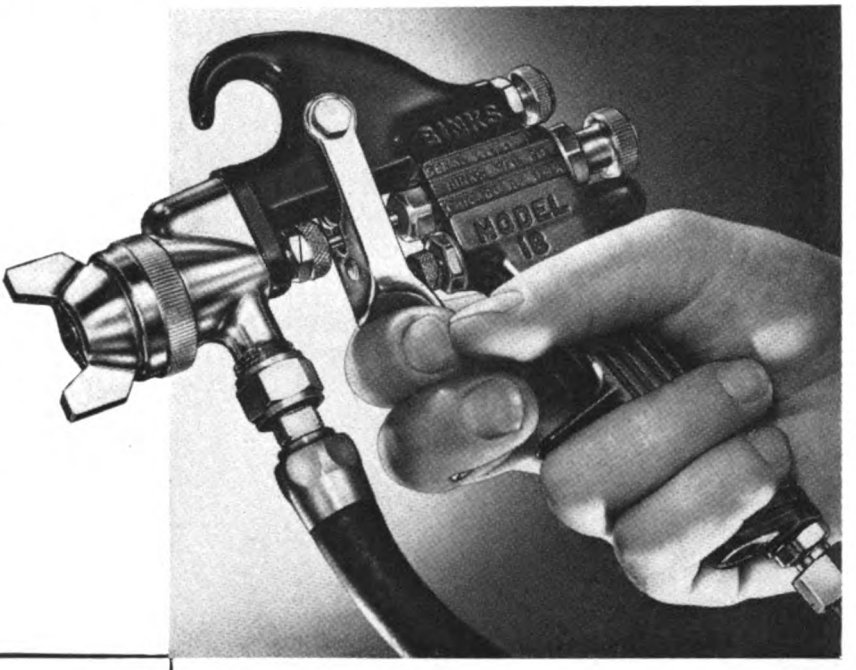
The Trackmobile is now available with a Cummins four-cylinder, four-cycle, valve-in-head diesel engine rated at 105 hp at 2,500 rpm. Three earlier models are gasoline-powered. *Whiting Corp., Dept. RLC Harvey, Ill.*

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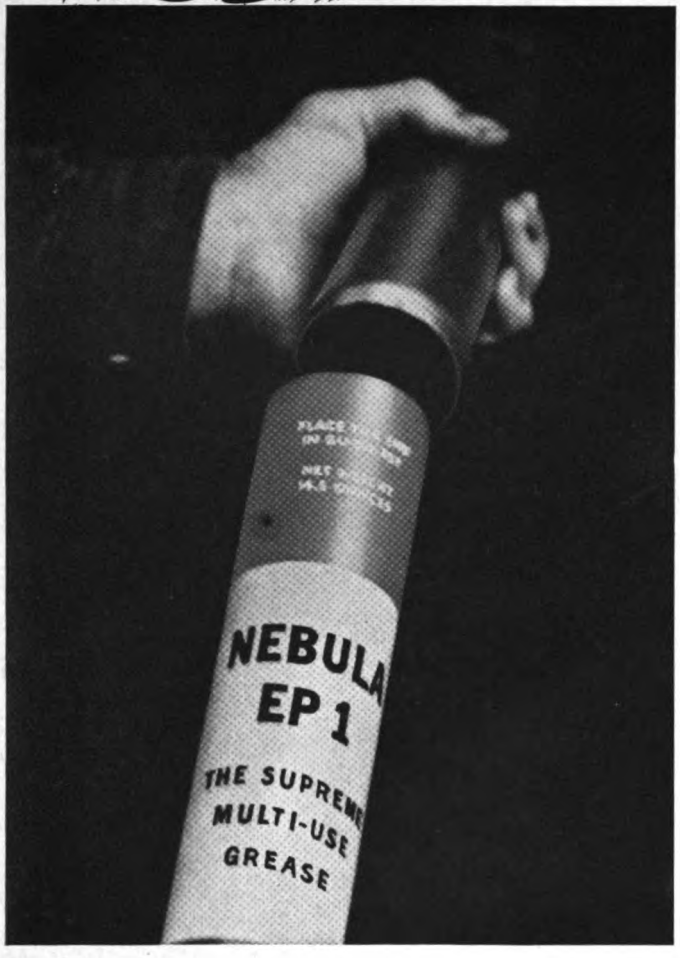
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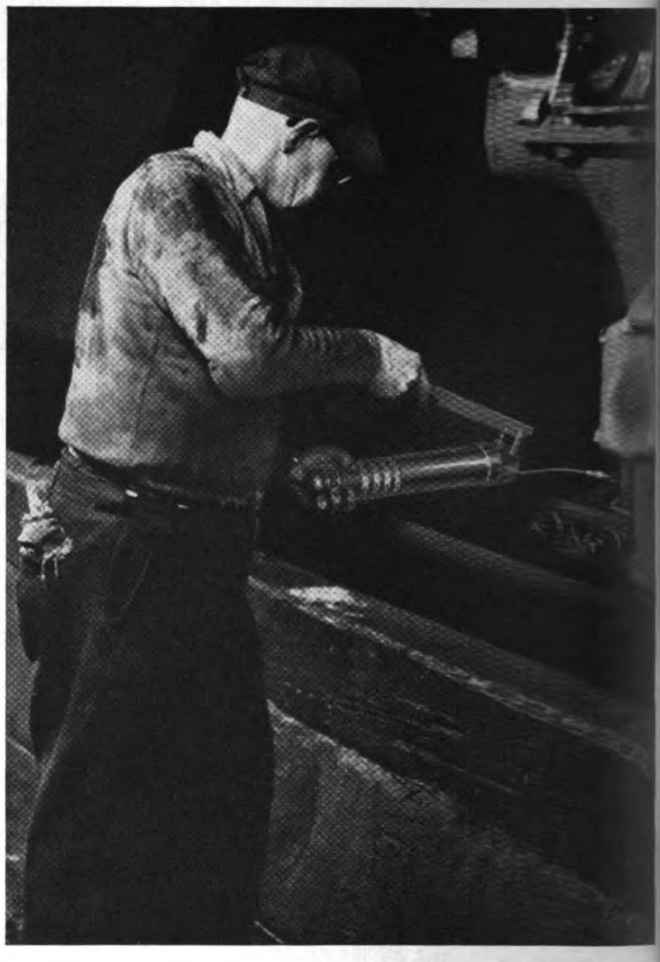
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ESSO STANDARD, DIVISION OF
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EDITORIALS

Direction for Progress

I first started playing football in the days when "first down" was made with a five-yard gain. A good lineman was expected to get so low to the ground that he could get under his opponent and push or lift him back. Then one day I decided to stand up and give my opponent a little added push to the ground. From this point of vantage, I suddenly discovered I could locate the position of the man with the ball and I could frequently stop him.

Now football has become an open running, passing game. Similarly, also has transportation. Once upon a time the railroads had little competition except with each other. Now with their major competitors on the highways and in the air, the railroads need to do some sharp looking, thinking and fast footwork.

In his report on rail failures, which is summarized in this issue, G. M. Magee, director engineering research, AAR, has reported on what heavy loading is doing to wheels and rails and has had the temerity to suggest that progress may be getting off limits. He indicates that some railroad thinking may need reorientation.

In recent years, car capacities have been increased until car-wheel loadings exceed those of many locomotives. Journal sizes have been established to meet load requirements. Heavier and stiffer rails make for better and safer track which requires less maintenance and causes less rolling resistance. Light rail, sometimes referred to as "rubber rail," causes each wheel to be constantly climbing out of a valley as the train moves along.

The heavy rail disposed of most of the troubles of the light rail but the evidence offered by Mr. Magee indicates that its very stiffness may have accelerated the incidence of other difficulties; namely, that of split rails and shelled wheels. These, it would appear, are brought about by the flow of metal caused by increasing unit pressures at the point of contact between the wheel and the rail.

Rivalry between departments may cause mechanical department men to question Mr. Magee's findings since he says little can be accomplished by making changes in rail or track structure. Rather, he suggests that needed improvements may be effected by increasing wheel diameters, by using heat-treated wheels, by developing multiple-unit cars for heavy lading, by going to six-wheel trucks, or by limiting car capacities to keep wheel loads within specified limits. He offers figures to show how much multiple-unit cars would reduce track maintenance.

It remains, of course, to be determined if any changes are immediately necessary and, if so, which may be employed to effect the best results in safety and economy. Such determinations require time, and Mr. Magee is to be congratulated for producing what he calls a "horseback analysis" and thus bringing the whole subject to the attention of the railroads with minimum delay.

Compatability between the flanged wheel on a steel rail is fundamental to the railroad industry. When trouble develops between these basic components, departmental considerations must not be prime factors in arriving at a decision. Mr. Magee has stood up to see where the ball is. It is this kind of thing that some refer to as fourth dimensional thinking. It opens up the game. It is a guide for progress in the right direction.

Changes for the Better

We are on the threshold of great changes in the railroad industry. In some areas, such as mergers, we are far beyond this point.

These changes are taking place and will take place because an embattled railroad industry is determined to use every weapon in its arsenal in the fight to regain the railroads' rightful place in serving our national transportation requirements and the nation's interest. The all-out battle is being waged on many fronts: in the fields of legislation, mergers, new transportation concepts, new services and technological developments.

The AAR made public last month a declaration it termed a "Magna Carta for Transportation." AAR President Daniel P. Loomis minced no words in releasing the declaration when he said the railroads "are tired of being the punching bag for destructive government policies and are determined to obtain equal treatment." The "Magna Carta" asked for four freedoms: freedom from discriminatory legislation; freedom from discriminatory taxation; freedom from subsidized competition; and freedom to provide a diversified transportation services.

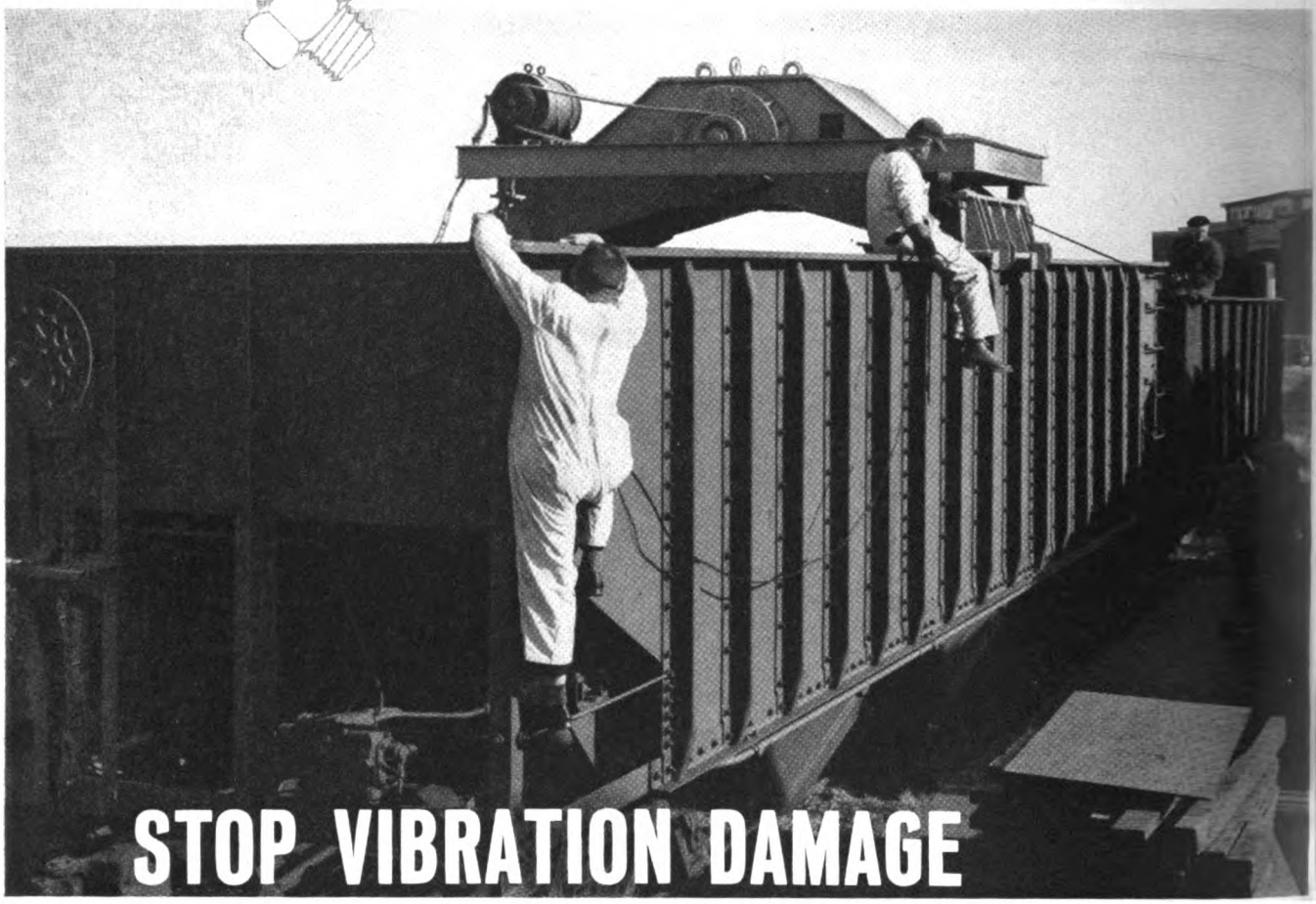
Mergers are making rapid changes in railroad maps. A few have been completed; about ten more are anywhere from the discussion to the application stages. They are a means of effecting economies essential to a healthy railroad industry. They reduce unneeded physical plant, eliminate duplication of facilities and waste, and improve services. Some displacement of personnel, top to bottom, is inevitable, but arrangements to cushion personnel changes have been made in mergers already effected and will undoubtedly be made in mergers to be completed.

Piggyback service reversed the trend toward the exclusive movement of certain commodities over the highways. It has combined the inherent advantages of rail and highway transportation. This spectacular development also has the teamsters "screaming" that it is discriminatory and unfair, a "shoe on the other foot" situation. This change in railroad operations is only a sample of the kind of service that is sure to be adopted—an integrated transportation system using the advantages of rail, road and water vehicles.

Technological developments have been made and are being made to serve the railroads' needs in this battle for that large part of the transportation volume they can supply so economically to the nation's advantage. The mechanical departments should keep informed of these developments and be ready with the technical know-how when the time comes, as it surely will.

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116th year



STOP VIBRATION DAMAGE

...to keep cars on the road

STRONGER CAR BODIES are being built—and rebuilt—with RB&W High Strength Bolts in place of rivets. The reason: high strength bolts make joints *permanently tight*. It's been proved in mechanical shake tests (like the one being conducted above) and actual road service. The difference was dramatically demonstrated when:

- One road fastened top chord, center sill, center sill cover, rear stops, draft-gear carriers, and air reservoir of a 70-ton hopper car with RB&W High Strength Bolts. Then they gave the empty car a three-hour shakeout. Test was stopped because the car was being torn apart—but all bolted joints were still tight.

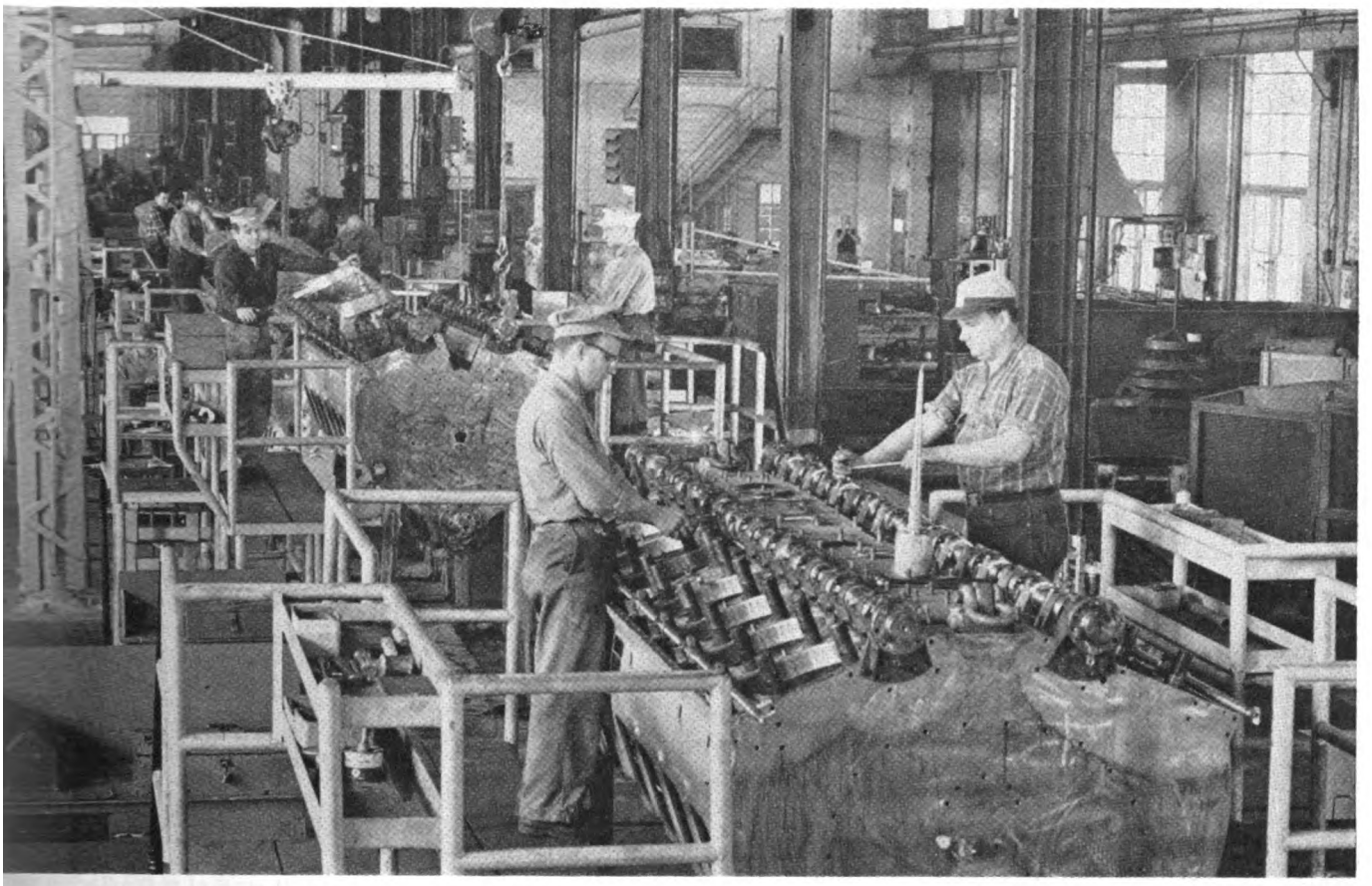
- On another road, a similar 70-ton hopper car was rebuilt, with half the underframe riveted . . . and the other half bolted with RB&W High Strength Bolts. Impact and shakeout test results were fine. Inspection after six months of service showed many rivets loosened—but all bolts still secure.

There's proof that bolts are better than rivets to *start* with. They're even more advantageous at repair time. Dismantling damaged members and reassembling is simply a matter of removing bolts and re-installing them. Compare that with the time for burning out rivets, then re-riveting. And bolting can be done on any repair track instead of in the shop.

If you're interested in cutting costs, you should know more about fastening with RB&W High Strength Bolts. Send for Bulletin RR-3, see catalog 1c/RB&W in the Modern Railroads Catalog File, or ask an RB&W engineer to call. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.



Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Sales offices and warehouse at:** San Francisco, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas



ngine build-up is a three-station operation with platforms arranged to simplify the work. Overhead crane moves engines from station to station.

Production Lines for ACL Engines

Increase production and higher work quality are the result of introducing assembly-line methods.

An important phase of the Atlantic Coast Line program to control equipment maintenance costs and improve work quality was the establishment of a diesel engine rebuild line at the Waycross, Ga., shop. The system, in operation for four years, places the assembly of complete engines on a production-line basis. Subsequently, a similar arrangement was made for the reclamation of engine components. Component overhaul operations are arranged along individual conveyor lines. Engine rebuilding is performed along a five-station engine-overhaul line. The reclaimed components are delivered by their conveyors as near as possible to the appropriate engine-rebuilding stations.

While the engine-overhaul section consists of five stations, only the second, third, and fourth are actually assembly stations, as Station 1 is the disassembly area and Station 5 is the load-test and final retightening station.

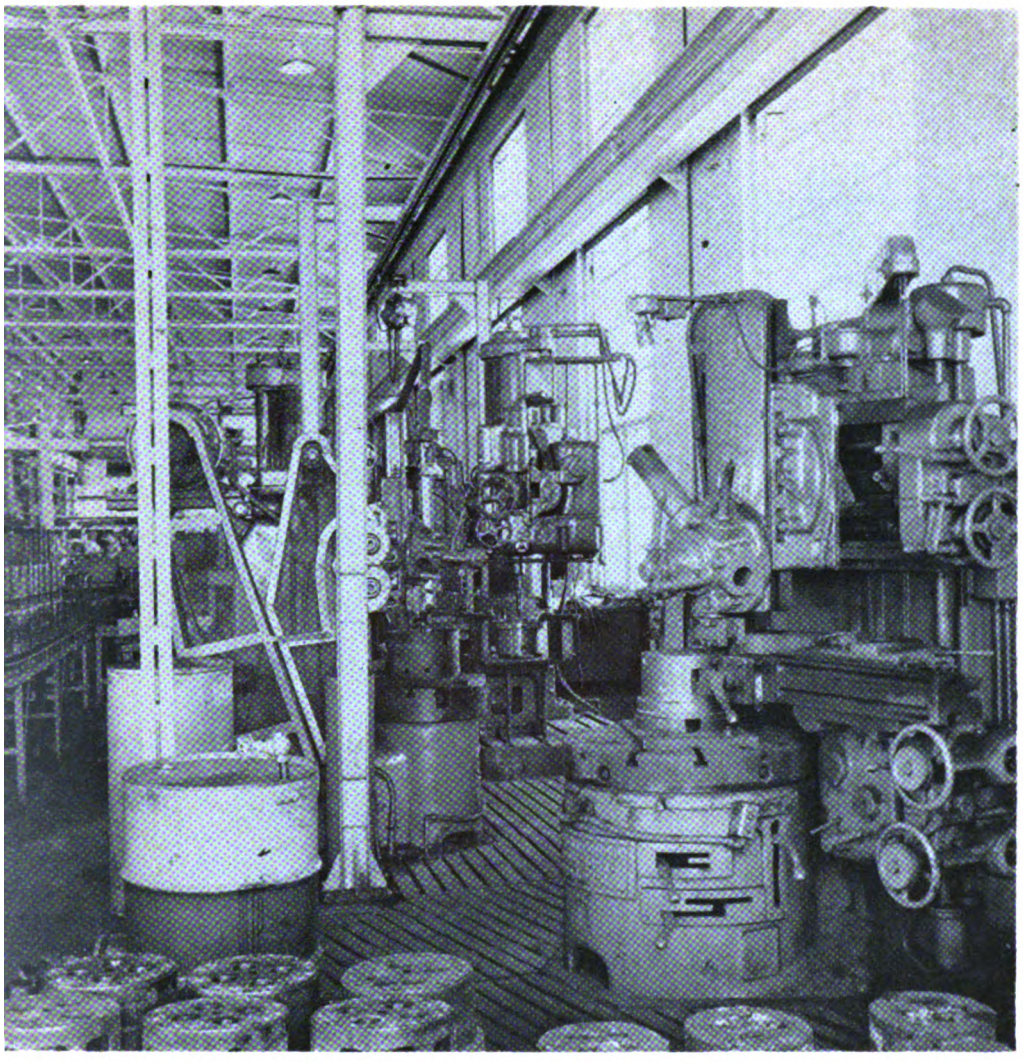
Engine Assembly

First assembly is at Station 2 where crankcases are measured, gaged, and checked for cracks. Camshafts and crankshafts are then applied at this station.

At Station 3 all power assemblies are installed and lead readings are taken. The engine and cylinder assemblies are water tested for leaks and the crankcase is applied to the oil pan.

At Station 4 all accessory-end and gear-end equipment is applied. Cylinder-head-cover support frames, injectors, rocker arms and fuel lines are fitted to the engine. It is then timed. From this point, the engines are moved to the load-test room.

Practically all Coast Line diesel locomotives are General Motors units. This simplified the design of these production-line facilities and their tooling. Typical monthly output is 12 rebuilt engines. Component reclama-



Welded cylinder heads will be processed on boring mill and vertical lathes. Overhead monorail is used for moving heads between machines. Liners and pistons move on roller conveyors.



Jig on vertical lathe is used for the machining of unwelded cylinder heads.



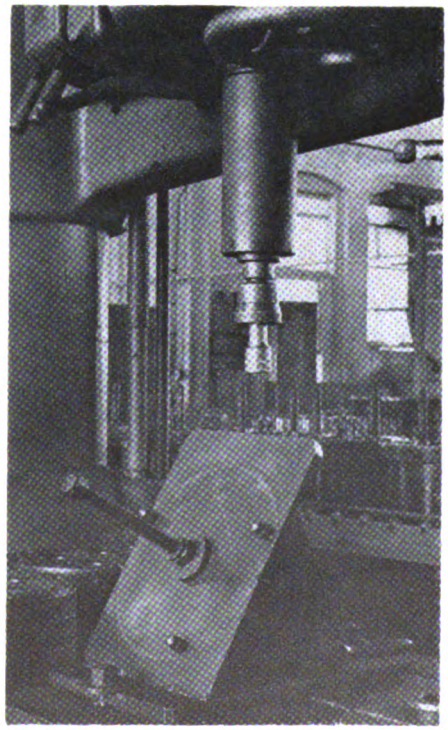
Welded heads are clamped in this jig for machining of their top surfaces.

tion facilities not only produce necessary parts for these, but also turn out material to be used for running repairs at the four maintenance points on the Coast Line.

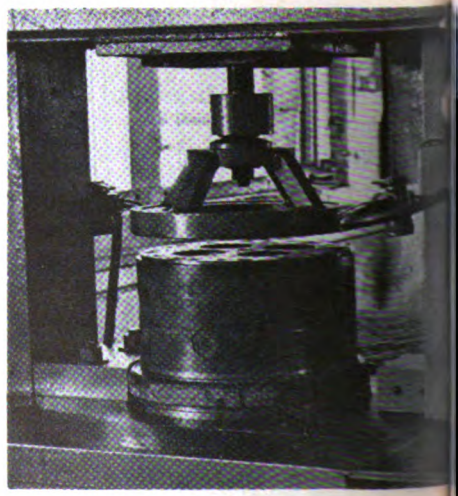
The five-station engine rebuild line, when stripping, rebuilding and load testing 12 engines per month, is manned by 20 machinists, 1 machinist helper, 2 sheet-metal workers, and 2 apprentices. When engines are being produced at this rate, there will always be an engine at each station, and the individual mechanics are assigned full time at specific stations.

Engine rebuilding, as the Coast Line now does it, represents a 39% reduction in forces from the original system in which each engine was completely reassembled at one spot. It has long been an ACL practice to load test and run-in its rebuilt diesels prior to their installation in a locomotive carbody.

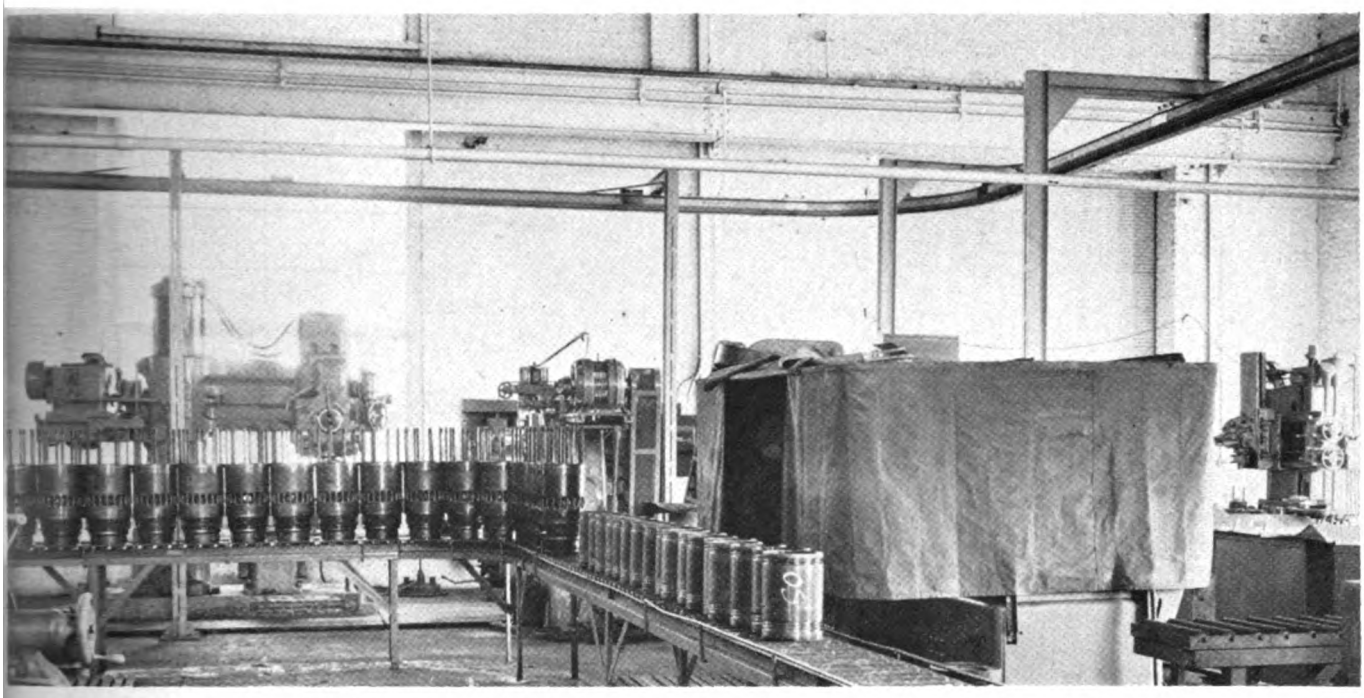
After almost two years of successful experience with the production arrangement for engine rebuilding, the ACL installed the engine component lines. Again, it was expected that costs would be cut and work quality improved. By eliminating manual handling of the power assembly com-



Cylinder-head jig on drill press is designed to machine mounting for cylinder relief valve.



Hydrostatic test jig is being lowered into place on welded and machined head.



Conveyor moves liners, pistons and heads past Magnaglo inspection station. Conveyor at right center moves pistons out for reconditioning.

ponents and by using the conveyors for live storage, manpower requirements were reduced.

Average monthly production of reconditioned engine components has been as follows: cylinder heads, 276; pistons, 276; connecting rods, 276; governors, 20; water pumps, 32; lube-oil pumps, 12; scavanging oil pumps, 12, and injectors, 276.

About 65% of the heads, pistons, rods, and injectors are used on the engine assembly line; the rest are used for running repairs at Waycross and other locomotive maintenance facilities. About 25% of the governors and water pumps are used for running repairs. Additionally, all other components for the entire fleet of 596 diesel units, such as air compressors, blowers, fans, steam, generators, rocker arms, and speed records, are reconditioned in this shop.

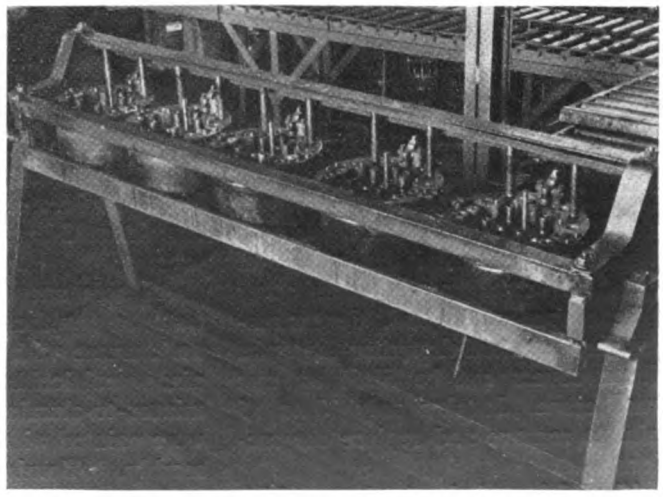
While only the power assembly components — heads, pistons, rods, and liners—are processed on the production line, the ACL has attempted to make the reconditioning of the other components as efficient as possible. Component reconditioning at the rates indicated above requires 29 machinists, 2 apprentices, 1 helper, and 2 laborers. This represents a 25% reduction in the force necessary before the conveyorized arrangement was installed for processing parts for power assemblies.



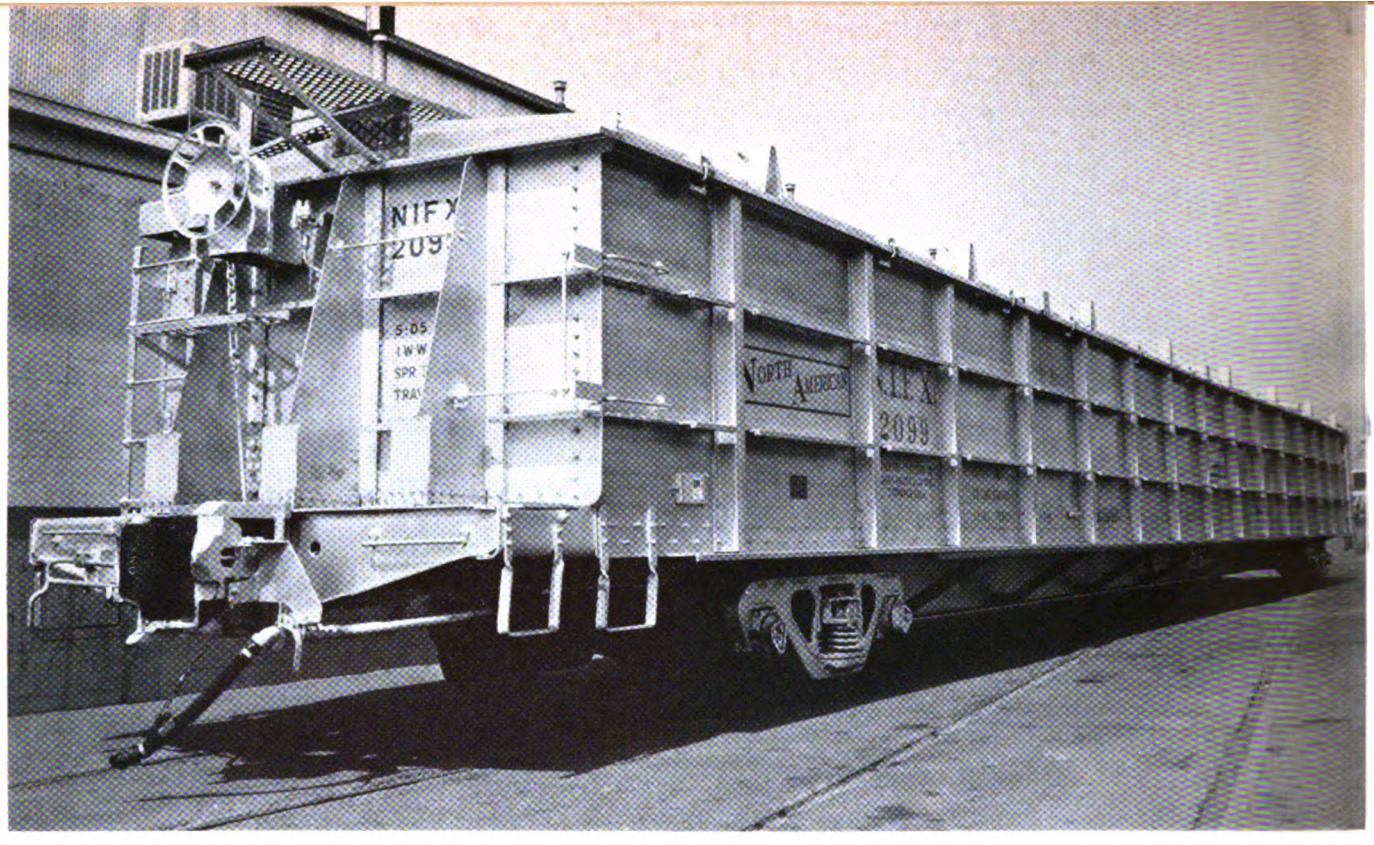
Liner honing device is used to prepare liners for reuse in rebuilt power assemblies.



Head, with iig clamped over water passages, is ready for hydrostatic test. Heads which pass go on for valve grinding.



Jig holds five heads for grinding of valve seats and assembly of valves in head.



Covered gondola, designed for handling extra-long extrusions, has aluminum body which is claimed to increase payload by 8 tons.

Aluminum Body for 85-ft Gondola

The 85-ft covered gondola recently put into service by the Rock Island was developed by Harvey Aluminum to demonstrate the economies which are made possible by mounting an extruded aluminum superstructure on a conventional steel underframe. It is designed to protect long metal shapes in transit and to make possible rapid loading and unloading. The Rock Island leases the gondola from North American Car Corp.

The car has completed a dozen trips —over 10,000 miles—handling shipments of strategic materials from California to Georgia, Kansas, and Washington. Extra long lengths of aluminum tubing and structural shapes were moved in each instance.

Loading the car proved easy. Four aluminum, watertight roof sections, each about one-third the weight of equivalent steel construction, cover the car from end to end. Center sections are removed first, then the ends. These covers can be lifted by any small crane. It takes only 10 to 15 min. to remove and replace the sections.

The 85-ft steel piggyback car, which serves as the underframe, was stripped and the side sills prepared for application of the custom-designed aluminum sections that make up the sides. These sections are extruded aluminum channels 82 ft long and 25 in. wide. They were made in a 12,000-ton hydraulic extrusion press at the Harvey Aluminum plant in Torrance, Calif. For each side the channels are riveted together, three high. The completed side is then riveted to the side sill. More than 90% of the joints in the carbody were made with Huck steel rivets. Before assembly, the channel flanges were punched for riveting and were cut and coped for application of the extruded aluminum hat-section side posts which are welded in place. The aluminum car ends are each reinforced with three 8 x 20-in. extruded aluminum I-beams tapered to their tops.

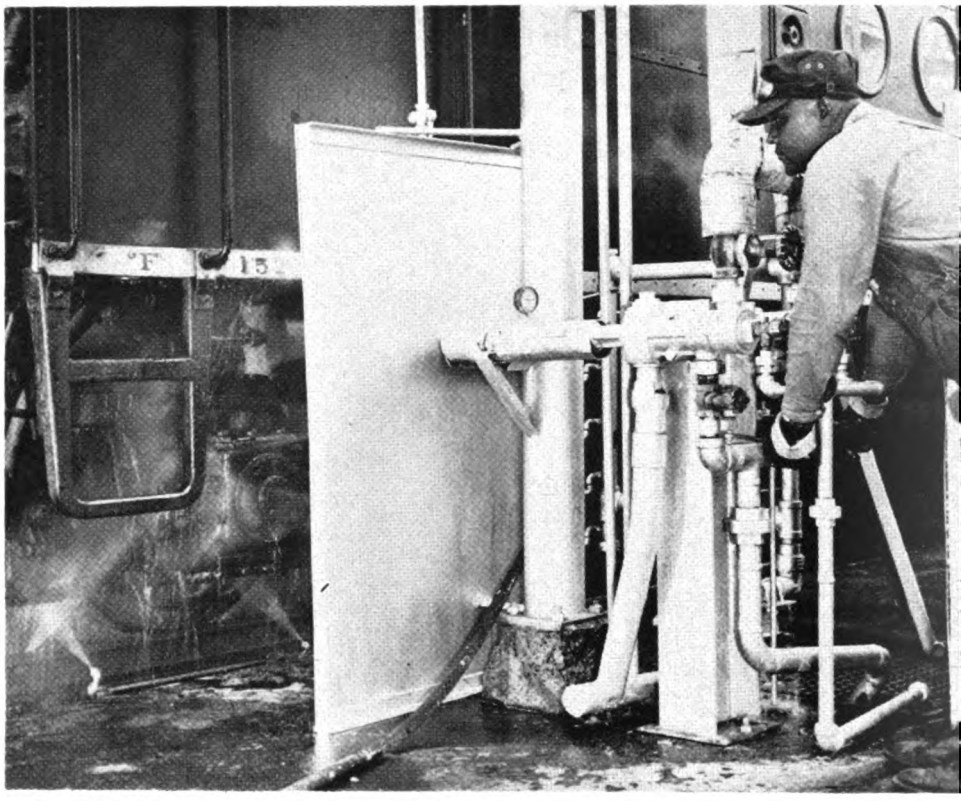
All side and end assemblies were fastened together and secured to the underframe with ½-in. Huck galvanized-steel lockbolts, or rivets. Aluminum-to-aluminum contact surfaces were painted with a primer before assembly. Aluminum-to-steel contact surfaces were prepared with a zinc chromate primer. All joints were caulked with a heavy coat of Alumilastic before assembly.

For the car roof, panel-type aluminum extrusions were fabricated into four 20-ft sections equipped with lifting eyes and stacking spacers. Running-board sections are permanently applied to each section. Three clamps on each side of each section hold it in place on the car body.

The car is equipped with easy riding trucks having one-wear wrought-steel wheels and roller bearings. Rubber draft gears are installed. Safety appliances are steel, installed in accordance with ICC and AAR requirements. The steel deck, underframe, brackets, stiles, etc., are painted aluminum.

The light weight of the completed car with aluminum superstructure is 75,900 lb and the load limit, 134,100. The aluminum superstructure weighs less than 10,000 lb. A comparable steel body and roof, it is estimated, would add eight tons to the empty car weight. Inside length between end sheets is 80 ft 4 in.; inside width, 8 ft 2⅞ in., and inside clear height, 4 ft 11¼ in. Cubic capacity is 3,240 cu ft.

Jet Cleaning For Santa Fe Diesel Wheels



Each jet has discharge capacity of 4,000 gph. Cleaning compound delivery can be varied.

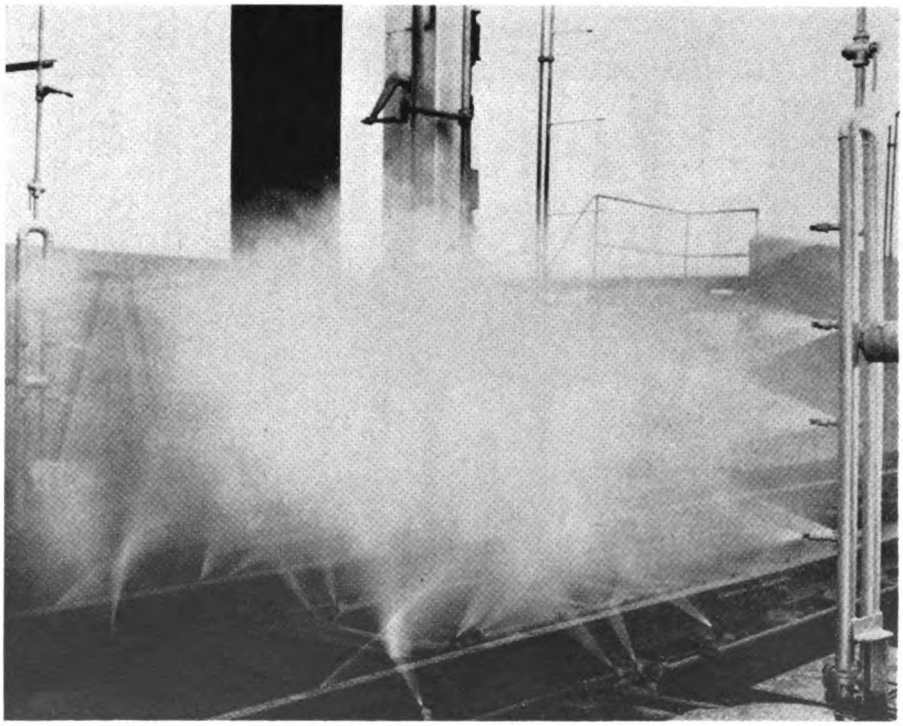
To clean the insides and outsides of the wheel plates of diesel locomotives passing through the washing facility at the Argentine, Kan., Terminal, the Santa Fe has installed special high-pressure wheel-cleaning equipment. A four-unit locomotive, moving through this wash rack at 1½ to 2 mph, is completely washed, including wheels, in about 6 min.

The wheel-cleaning installation, placed between the initial and final brushes at the wash rack, consists of Sellers 4,000 gph high-pressure hydraulic jets and washing sprays. Two jets, in parallel on one side of the wash rack, supply the spray nozzles with the cleaning mixture. Each serves the wheel and truck spray piping system on both sides of one rail of the wash-rack track.

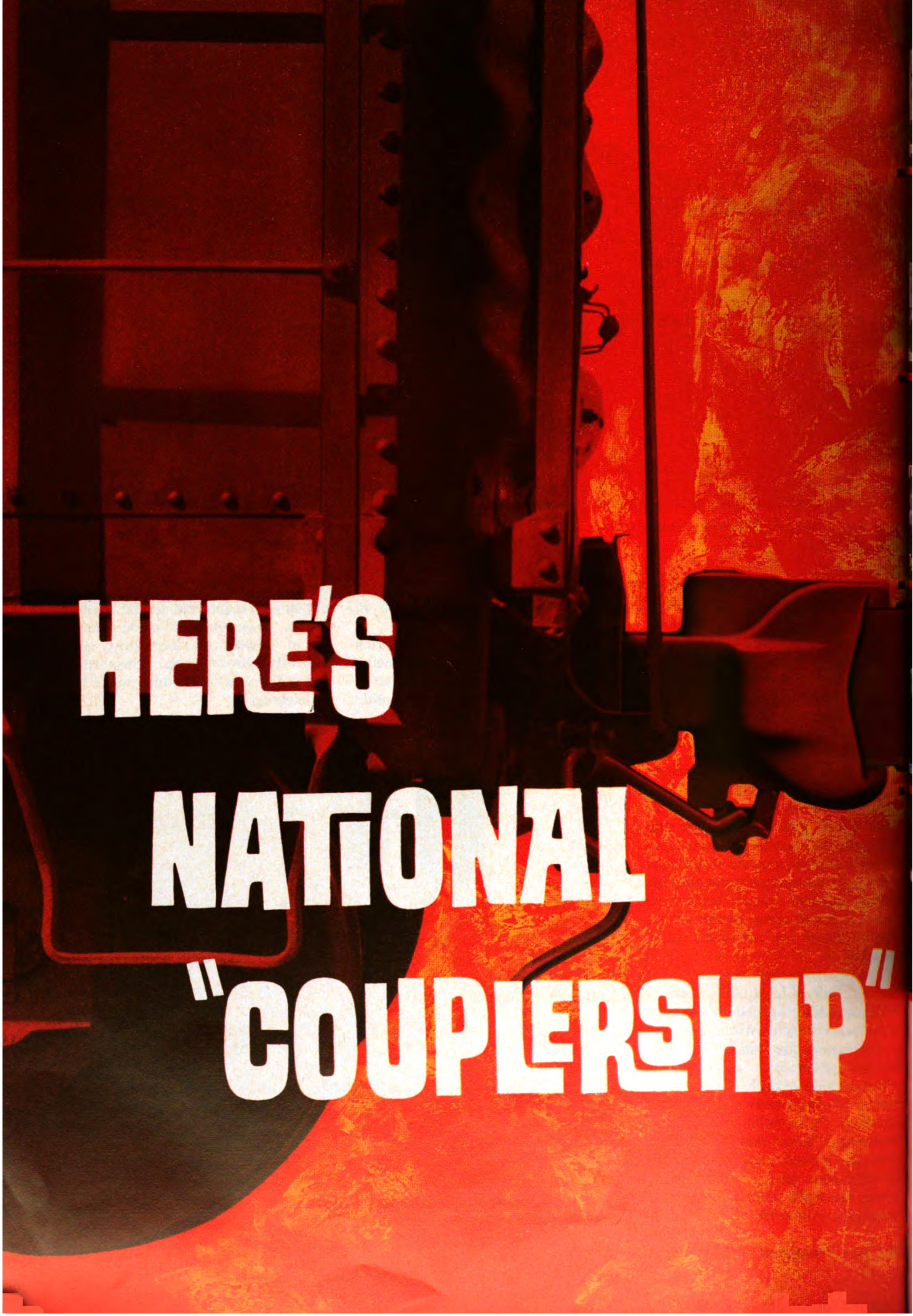
Cleaning detergents, mixed with hot water and fuel oil in agitating tanks in the supply house, are fed by circulating pumps to the jets. Water and fuel-oil proportions are varied with different detergents.

On each side of each rail, within a space of 7 ft, are the four spray nozzles which clean both sides of the wheel plates. In addition to this set of sprays, the jet also supplies a standpipe which has eight spray nozzles for washing the truck sides and a single vertical pipe connected with four elevated nozzles which wash running boards and hoods of switcher and road-switcher locomotives.

All locomotives are washed each time they pass over the fuel servicing inspection facility at the completion of a trip. Prior to washing, incoming locomotives are inspected and initial servicing is completed at the fueling station. Inspections are made regardless of whether the locomotive subsequently moves to shop for inspection or repair, or to outbound tracks for dispatching.



Vee nozzles along rails clean wheels; standpipe jets clean truck and carbody sides. Cleaning solution drains to sump and is recirculated.


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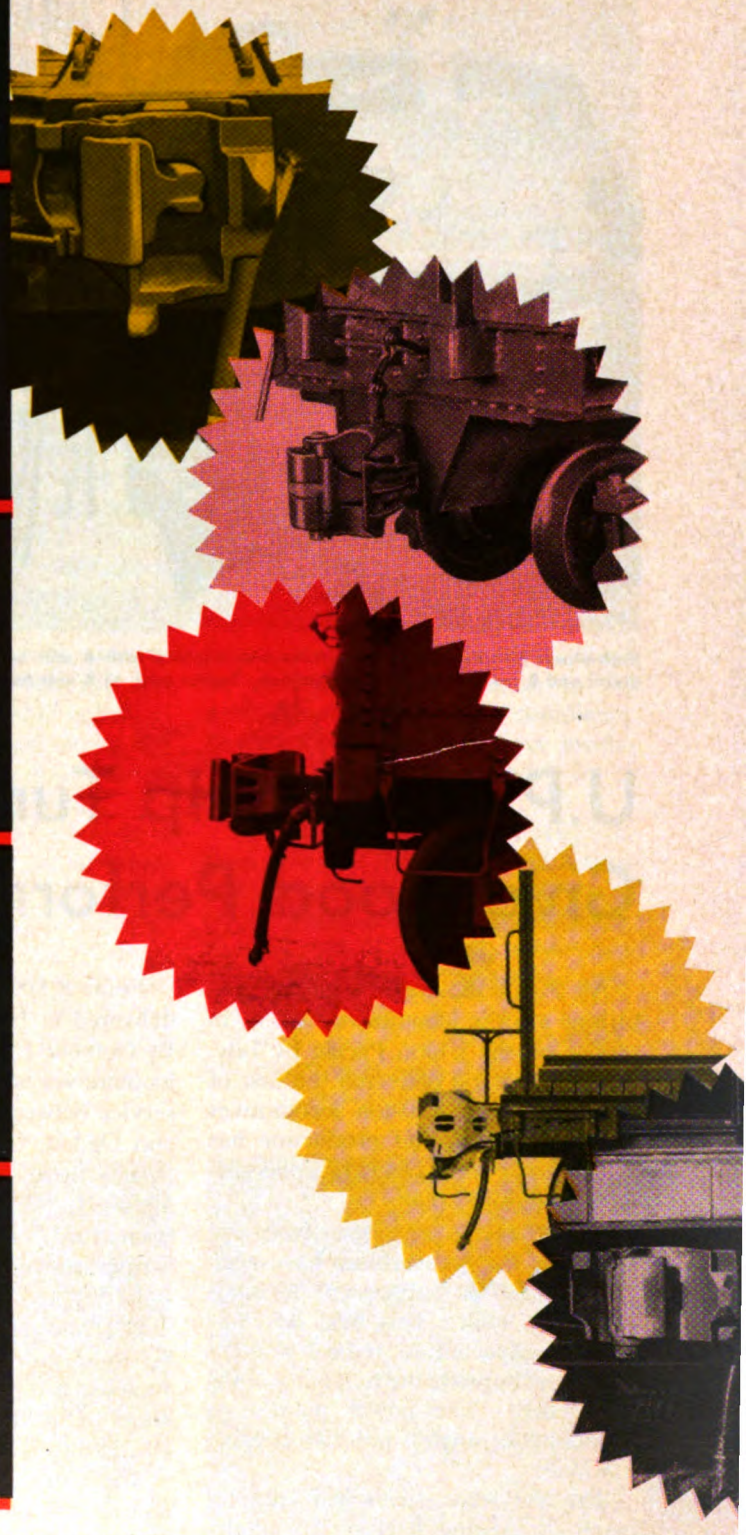
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High-power turbine locomotive is three-unit machine with A unit housing controls and auxiliary diesel and B unit containing main turbine. Tender back of B unit hauls residual fuel.

U.P. 8,500-Hp Turbines Give Good Performance

All 30 of the world's largest gas-turbine electric locomotives will be in service on the Union Pacific by July. General Electric delivered the first of these 8,500-hp, 420-ton locomotives in August 1958, and production has continued at approximately a one-per-month rate since then.

Improvements developed from operation of the first turbines have been incorporated as subsequent locomotives were built. This field development is expected to reduce maintenance and improve the reliability of the entire fleet. The power plant is a simple-cycle, single-shaft, two-bearing machine.

The 30 locomotives will supplement an existing fleet of 25 single-unit, gas-turbine locomotives placed in service between 1952 and 1954 (RL&C, Aug. 1952, p 85). They are powered by four-bearing gas turbines rated at 4,850-hp at 1,000 ft elevation and 80 deg F ambient.

From a paper by H. Rees, senior mechanical engineer, Union Pacific, presented before recent Gas Turbine Power Conference, ASME, held in Washington, D.C.

Four 8,500-hp locomotives were delivered in 1958 and seven in 1959. By October 1, 1960, nineteen of these locomotives were in main-line freight service between Council Bluffs, Iowa, and Ogden, Utah. Rail distance between these terminals is approximately 1,000 miles. Elevation varies from 1,033 to 8,013 ft. Ambient temperature can be anywhere between —40 deg and 110 deg F.

By October 1, 1960, the nineteen 8,500-hp turbines in service had amassed a total of over 95,000 fired hours. One turbine had operated for 10,218 hr.

The work potential of these locomotives can be judged from their performance during 1959. Because seven locomotives were delivered progressively through that year, total service was 90 locomotive months. A total of 1,076,772 locomotive-miles was operated an average of 11,911 miles per locomotive month. The big turbines hauled 5.3% of the UP total freight gross ton-miles.

During September 1960, with 19 locomotives in service, the average was 11,776 miles per locomotive, and 12.6% of the UP freight gross-ton-miles was handled. During this same month, 75 new SD24 and 30 new GP20 diesel-electric units assigned in comparable service on the same district averaged 12,110 and 12,322 miles per locomotive unit, respectively.

Service conditions for these 8,500-hp gas turbines are severe. In stationary service, a gas turbine generally operates with few starts and stops under a comparatively steady load. Locomotive service imposes frequent starts and stops with a load that varies. Because of railroad clearances, there is practically no space available for the filtering and silencing of inlet air. The close confines of the locomotive carbody make inspection and maintenance difficult. The turbine must withstand the vibration and shock loads of railroad operation.

While these rugged conditions are ideal for accelerated testing of equipment, it is almost axiomatic that equipment which has given excellent trouble-free service in air, marine, and stationary installations will develop unexpected troubles when operated in a railroad vehicle. The 4,870-hp, four-bearing gas turbines placed in locomotive service from 1952 to 1954 developed problems in the first 10,000 hr which did not show up in identical units in stationary service until years later, if at all.

The General Electric frame size 5 gas turbine used in the 8,500-hp locomotives is a simple-cycle, single-shaft, two-bearing machine having a 16-stage axial compressor and a two-stage turbine operating at 4,860 rpm. It has ten reverse-flow combustion chambers which operate on treated residual fuel after starting on diesel fuel.

This turbine, when ordered in 1957, was an entirely new model. Many modifications were developed on the manufacturer's test stand before the first locomotive was delivered in 1958. The need for others was discovered in field service. Improvements developed as the result of service problems were immediately incorporated by the manufacturer in turbines not yet delivered.

Service to date indicates that the basic design concept of this two-bearing gas turbine is fundamentally sound and that it will prove to be a long lived, minimum maintenance machine.

There have been 22 occasions to

(Continued on page 34)

PFE Determines Insulation Requirements...

Fresh-Produce Mechanical Reefers

Mechanical refrigerator cars which Pacific Fruit Express has recently placed in service for shipments of fresh fruits and vegetables are expected to yield significant data about insulation requirements for such service. The 25 Class R-70-11, "fresh-produce, semi-envelope" cars, built at the PFE Los Angeles shop, are designed to maintain ladings in the 30 to 70 deg F temperature range.

While these cars have the same structure, power plant and refrigeration equipment used for the 1,000 all-purpose R-70-12 cars completed last year by PFE (RL&C, August 1960, p 29), less insulation is needed because the new cars will not be used for frozen-food ladings which require temperatures to minus 10 deg. F. It is hoped, by avoiding the extra costs involved in providing "deep freeze" temperatures, that the transportation costs for fresh fruits and vegetables moved in mechanical cars can be held at reasonable levels.

Only basic structural difference between the two classes of cars is that the 25 experimental units have been equipped with cushion underframes. Ten of the cars have the Hydra-Cushion device in which the impact forces are absorbed and dissipated as an inclined casting passes over a vertical hydraulic cylinder, compressing brake plates built into the floating sill (RL&C, May 1957, p 53). Fifteen cars have Super-Cushioned underframes in which the impact forces are absorbed by high-capacity ring spring units.

While the cushion underframe makes the length over coupler pulling faces 57 ft 7 in. as compared with the 55 ft 11 in. of the R-70-12 cars, all other exterior dimensions are the same. Overall length is 52 ft 2¼ in.; height to top of running board, 15 ft 1 in., and side door openings, 8 ft wide. As with the R-70-12 cars, the carbody is all welded with external side posts. Roofs and ends are also of all-welded design. This construction simplifies application of insulation and tends to reduce heat infiltration. The increased light weight, 90,000 lb as compared with 86,300 lb, is due to cushion-type underframes which are used instead of the conventional arrangement used on the 1000 Class R-70-12 cars.

The Class R-70-11 cars have 2 in. less insulation in the walls, floors, and ceiling, producing an increased inside length, width, and height, and a greater cubic capacity.

Although the higher minimum temperatures are maintained, the new cars have the same refrigeration system used in the R-70-12 cars. This assures full interchangeability between the two classes of cars. It also permits direct comparison of system performance of cars with different insulation thicknesses.

While four different types of insulation are used, all cars have 5-in. rigid foamed plastic panels in the floor with foam-in-place insulation between the side sills and the outer floor stringer.

Five cars have 5-in. foamed plastic panels in walls and ends, and a 4-in. thickness of Fiberglas blanket, plus 3 in. of multi-layer insulation in the roof. Another five cars are completely insulated with the multi-layer insulation—5 in. in the walls and 7 in. in the roof.

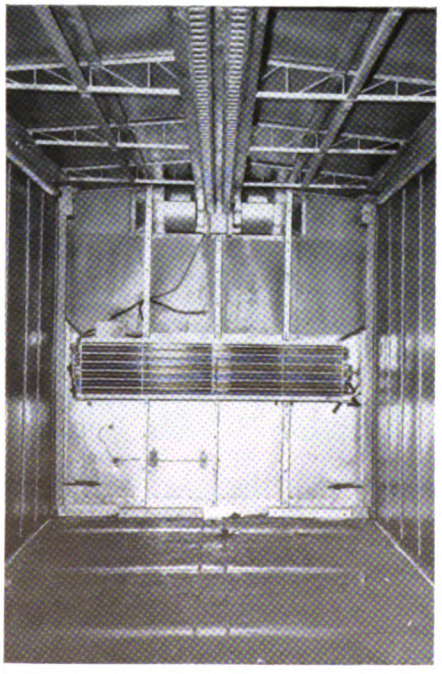
Corrugated polystyrene panels, 5 in. thick, are used in the walls and B ends of five cars, along with 5 in. foamed-plastic panels in the A-end bulkheads. For the roof, 7 in. thick polystyrene panels are laid upon the ⅜-in. plywood subceiling.

The 10 cars with the Hydra-Cushion underframe have 2 in. of blanket

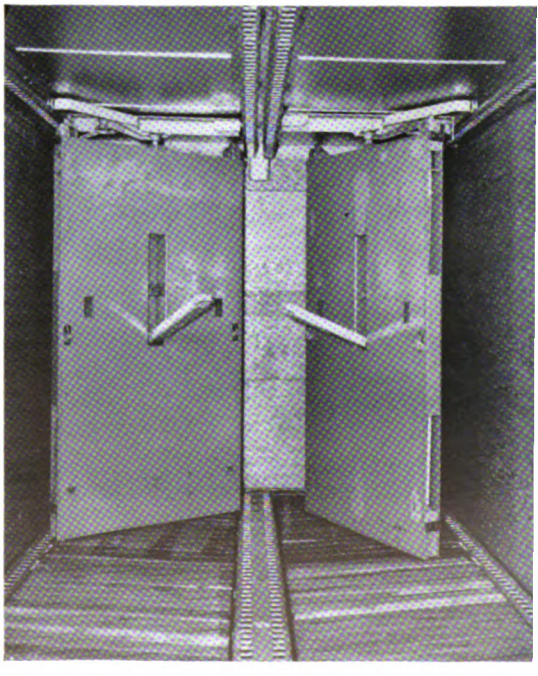
(Continued on page 28)



Plastic-faced insulating panels installed in car shell. Wavy channels in surface act as flues.



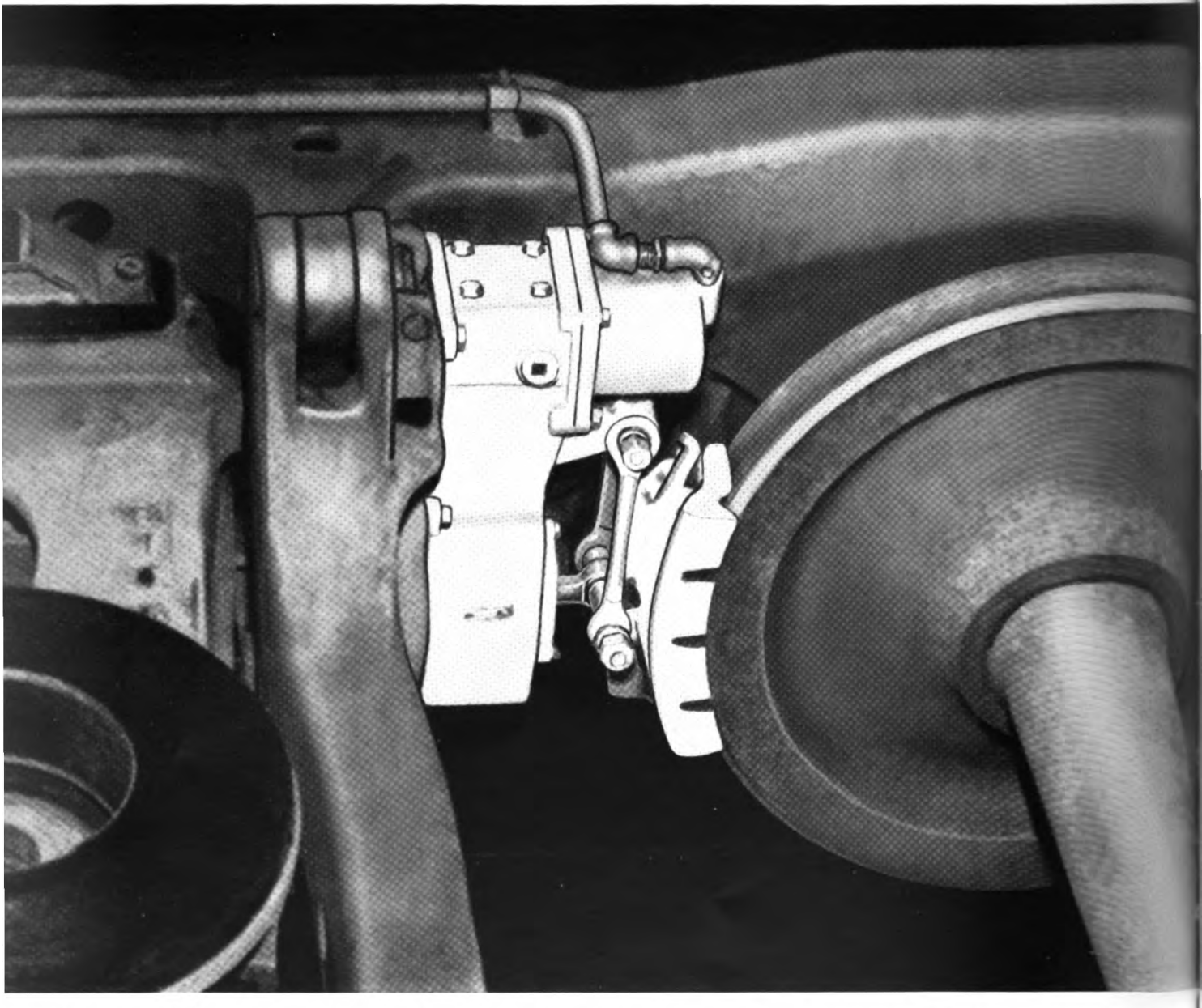
Evaporator is mounted on bulkhead. Roof has been installed; trusses will support ceiling.



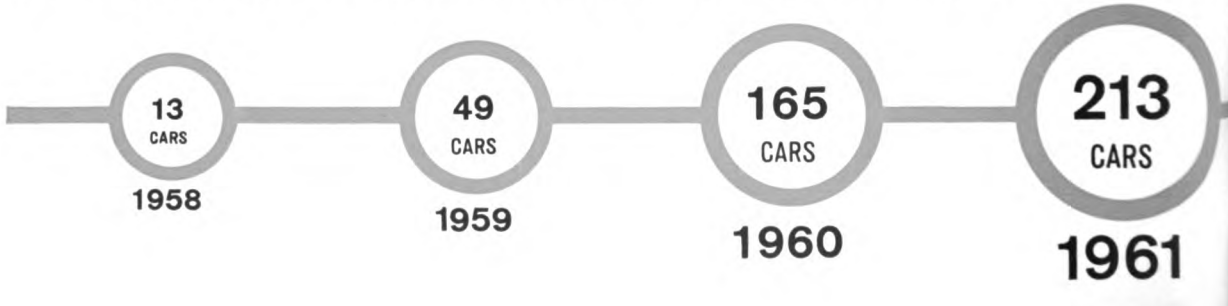
Load dividing gates are supported between tracks mounted under roof and in floor.

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Fiberglas and 3 in. of multi-layer insulation in the walls and ends, and 7 in. of Fiberglas and layer insulation in the roof.

All cars have 8-ft doors with an inner lining consisting of a corrugated plastic panel which is filled with expanded polystyrene insulation. Floor racks—aluminum stringers with herringbone hardwood slats—have adequate strength to support fork-lift trucks. Floor drains at each end of the lading space facilitate interior cleaning.

Reducing the thickness of insulation gives the R-70-11 car a lading space of 3,625 cu ft—451 cu ft more than that of the R-70-12 cars. Inside length between load divider gates is 45 ft 2 in.; inside width, 9 ft. Both dimensions are 4 in. larger than comparable measurements of the R-70-12 cars. Inside height, floor rack to ceiling, is 8 ft 11 in., and the available clear lading space is 8 ft 6½ in.

All 25 cars are equipped with movable steel load dividers, making it possible to sectionalize lading space into three compartments of various lengths. These dividers are equipped with positive locking devices to absorb heavy impacts.

Refrigeration equipment drives include a 10-hp semi-hermetic compressor motor, a 2-hp condenser fan motor, and a 1-hp evaporator fan motor. Power is supplied by a 20-hp diesel engine which drives an alternator. Fuel tank capacity is 500 gal.

The diesel has an actuating device that allows the engine to operate at two speeds—1,200 rpm and 1,800 rpm. The 1,800-rpm engine speed produces 60-cycle, 220-volt current; 40-cycle, 150-volt current is generated at 1,200 rpm. The battery is a 12-volt nickel-cadmium type, charged through a silicon rectifier by the alternator.

When equipment is started, the engine operates at low speed for a 2-min warm-up period, controlled by a time delay relay. A solenoid valve then brings the engine to full speed, simultaneously loading the compressor. The refrigeration system operates at full speed and fully loaded until the thermostat temperature is 2 deg above the thermostat setting. Engine speed then drops to the low range and the compressor operates until air temperature reaches the thermostat set point when two of the three compressor cylinders are unloaded. The refrigeration system cycles out 1 deg below the thermostat set point. Heating and defrosting are accomplished at the low speed. Car temperatures are controlled by mechanical thermostats which operate on a temperature-sensing mercury-bulb principle.

Car thermometers have a rigid straight probe installed through the car side below the evaporator. If a car thermometer becomes defective, it can easily be replaced while the car is under load.

A plastic tube with a spring-loaded cover, applied through the bulkhead just below the thermostat probe, makes it possible to check return air temperatures while the car is loaded. A pocket thermometer can be inserted to check the accuracy of the thermostat setting or car thermometer.

New Problems in Car Interchange

This is the twenty-sixth installment of a series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs To, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirements of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the Rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, come from a background of intimate association with the application of the rules. Obviously, comments or opinions as of today may be inapplicable after a revision of the rules or further interpretations by the Arbitration Committee.

Do the present rules require railroads to stock roller-bearing assemblies at repair points for repairs to foreign cars? (279)

No.

When lighting is furnished for loading or unloading baggage or express cars not equipped with permanent lighting fixtures, should the expense involved be assumed by the handling line or the car owner? (280)

It should be assumed by the handling line.

Is it proper to render a charge vs. car owner for in-date testing of air-brake equipment on passenger cars? (281)

No. Present rules do not provide for such charge or for the application of in-date test stenciling.

Where journal lubricating devices are found to be water soaked, requiring service treatment and the application of car oil, who is responsible for the expense involved? (282)

Such expense should be assumed by the handling line.

Is it proper to apply to foreign cars Grade B coupler knuckles which have been repaired by welding? (283)

No. This practice is now prohibited.

Do repair forces exercise their own judgment as to when journal lubricating devices require renewal, or do they have established conditions to guide them? (284)

New paragraph (h-4) of Rule 66 provides equitable conditions under which journal lubricating devices shall be renewed.

Is it proper to request defect card from delivering line for a container missing from car received in interchange which is not used in TOFC service, the car itself not having been involved in unfair usage? (285)

No. See Section (11) of Rule 22.

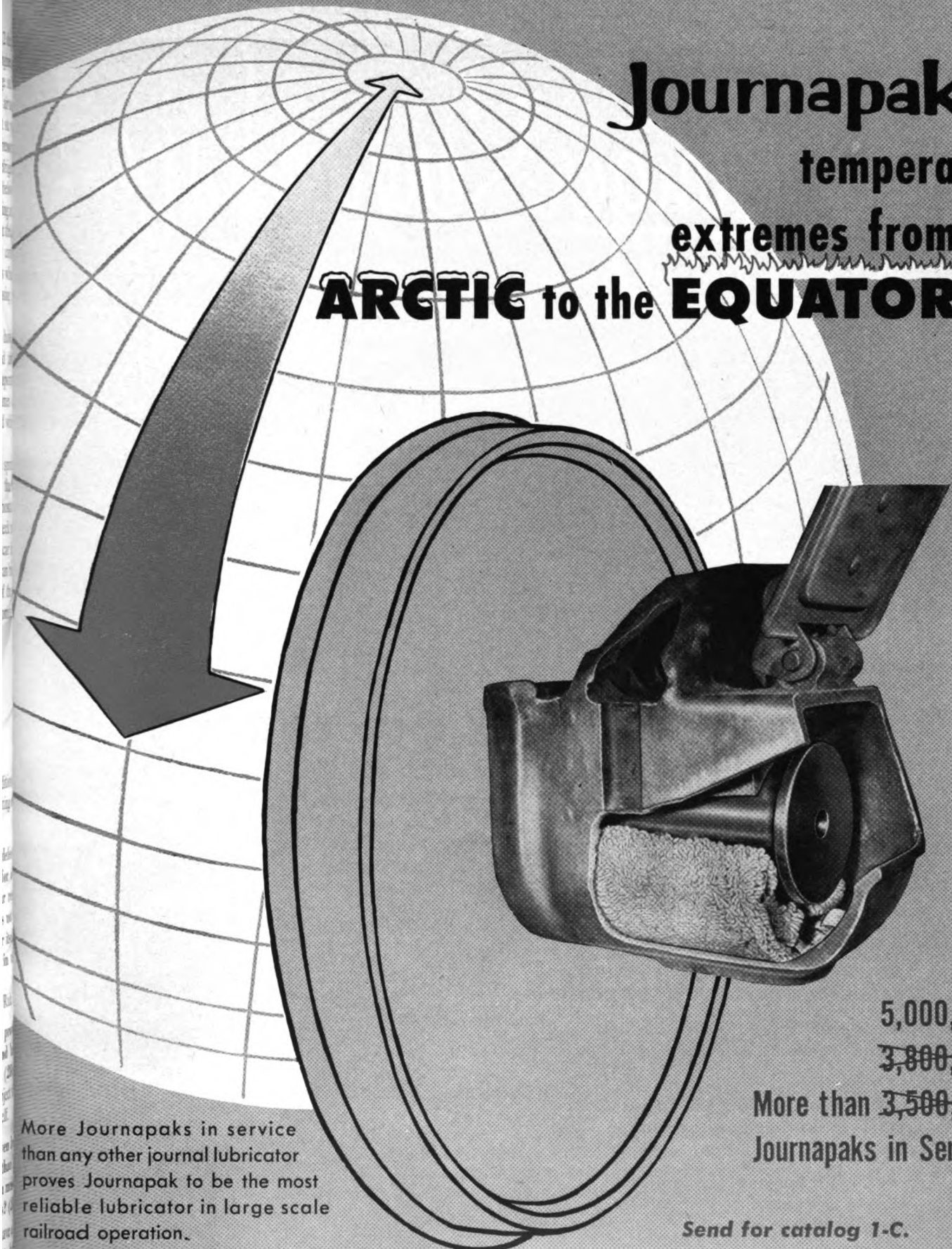
Is defect card protection provided for removable roofs and lading covers of open-top cars? (286)

Yes. These items are subject to the same rules as the car itself.

When freight cars are given heavy repairs, involving more than 100 man-hours, what attention must be given to truck side frames? (287)

Truck side frames must have all of the accumulation of dirt, heavy paint, rust, and scale removed before they are returned to service, so that, if any progressive fractures subsequently develop, they can be readily detected and repaired before complete failure occurs.

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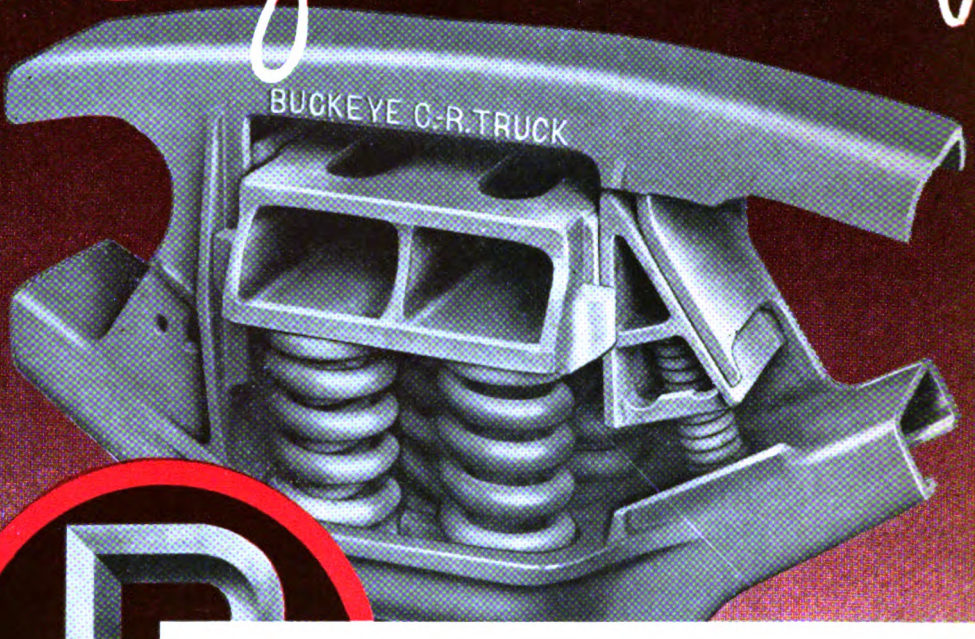
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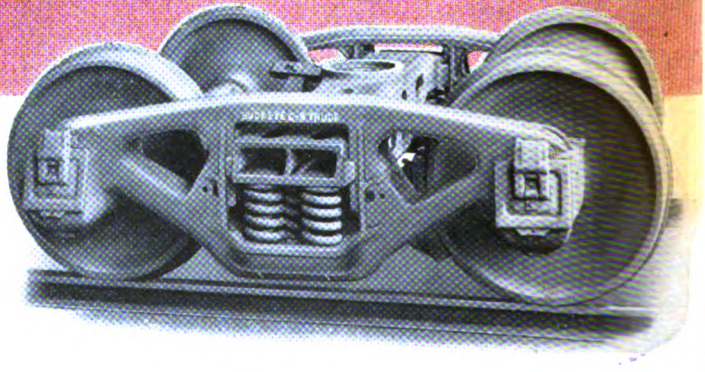
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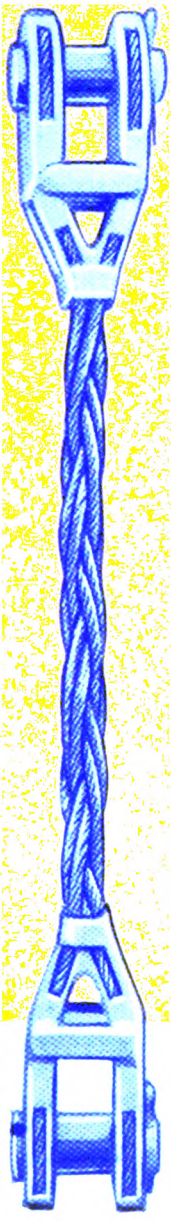
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THEY PLANNED ON YELLOW STRAND TO HOLD DOWN COSTS

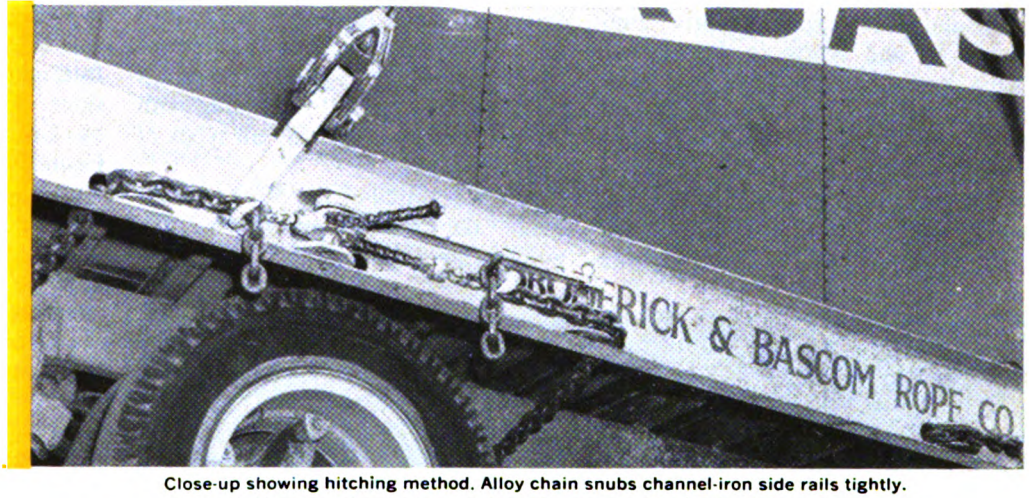
on piggy-back loading operation



Lifting rig uses four type M1-BT Yellow Strand Braided Safety Slings, 8 parts of ½" rope, and twin thimbles, allowing rope to run completely around thimble.



Type M1-TT Sling

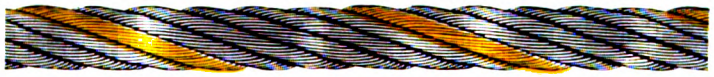


Close-up showing hitching method. Alloy chain snubs channel-iron side rails tightly. Yellow Strand patented twin thimbles secure sling bridles to beam.

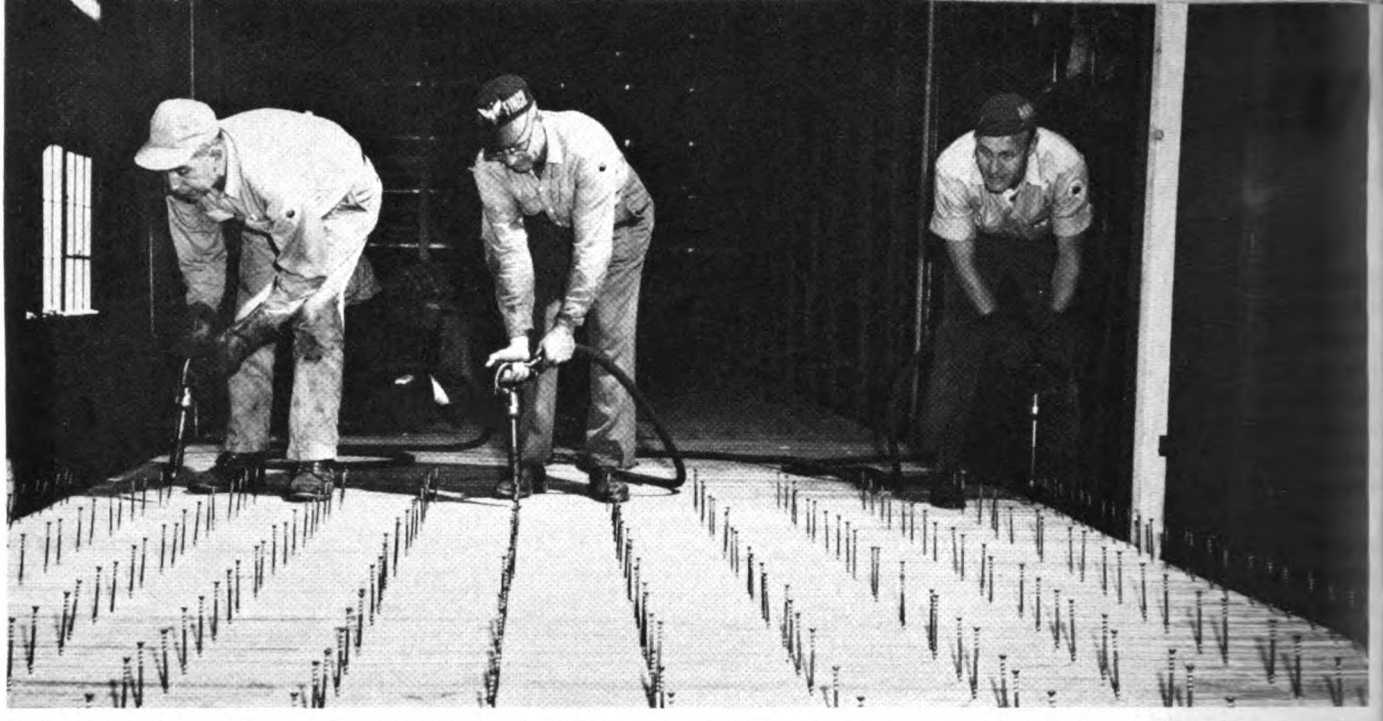
Yellow Strand Sling Experts and Wabash R.R. Develop Unique Low-Cost Piggy-Back Lift

One of the many advantages you get with Yellow Strand is service. Yellow Strand experts helped develop this economical lifting rig taking advantage of equipment already in use for other purposes. The assembly is versatile, quickly and easily applied, and handles different trailers with minimum adjustment. The strong, durable Yellow Strand Braided Slings will lift forty tons. What's your sling problem? Call your Yellow Strand representative anytime for expert help – for the very finest in all types of slings.

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Rapid nailing of heavy flooring was accomplished with air-operated nail driver. Three men proceeded through car, driving 1,350 spikes.

Northern Pacific Builds 'RBL' Cars

Insulated box cars recently completed by the Northern Pacific are being used to transport tin plate from eastern mills to the West Coast and to handle eastbound movements of canned goods and other products which require damage-prevention devices. The 150 RBL cars built at the NP's Brainerd, Minn., car shop are designed primarily for the coiled-tin-plate service and have a capacity of 4,611 cu ft. The 9-ft door openings facilitate loading and unloading with lift trucks widely used by all types of shippers today.

Other features of the 50-ft cars include the road's heavy-duty, all-welded steel underframes equipped with the Barber Cushion-Tube device (RL&C, March 1959, p 19) and International Steel all-welded steel sides. Lading protection is provided by Evans DF-2 and Pacific Car & Foundry Car-Pac loader equipment. The ASF A-3 ride control trucks are equipped with one-wear wrought-steel and cast-steel wheels, $3^{11}/_{16}$-in. travel springs, and SKF Expediter 6 x 11 roller bearings. Roofs and floors are insulated with 4-in. of Fiberglas. Side walls and ends have 3 in. of Fiberglas.



Insulated box cars for coiled tin plate are equipped with lading devices and with floating-tube type of cushion underframe.

The car has a light weight of 74,800 lb and a capacity of 134,000 lb. Inside width is 9 ft $4^{1}/_{16}$ in.; inside height, 9 ft 10½ in., and inside length, 50 ft $^{1}/_{16}$ in. Length over end sills is 50 ft 8¼ in.

Installation of the Doweloc 2⅜ in. hickory flooring was completed in "record" time by using Chicago Pneumatic CP-5XBND air-powered nail drivers. The 50-ft floor was completely finished in 45 min by a three-man crew driving 1,350 double-grip 5½-in. spikes. The nail driver can be operated from the shop air line or a small portable air compressor. A metal sleeve encloses the nails while they are being driven, eliminating the hazards associated with hand driving. The compact, lightweight tool can drive any nail from the 20-penny to 60-penny size.

Who Robbed Gus?

By Ken Wright

The mechanical refrigerator car business had been increasing steadily. Everyone was getting plenty of experience, even Old Gus who initially had been very obstinate about these "new fangled playthings." Gus grudgingly took assignments on the cars and, finally, as he worked on more of them, became very interested.

One morning Big Jim, the boss, was outlining and assigning jobs. Several mechanical reefers were in for inspection and maintenance. Big Jim, realizing that Gus did not have too much experience, assigned him a car which was to be started and cooled down for loading later in the day. This would be routine, because the car had been inspected earlier.

A little later Gus rushed up to Pete breathlessly. "Pete," he exclaimed, "I've got trouble! Someone has stolen the battery and some other things out of that car I'm supposed to be starting. Will you come over and tell me what all is missing so I can report it to Big Jim?"

Pete looked at Gus incredulously. "Are you sure you looked the car over completely?" Pete asked. "You know that some cars have the battery in a box underneath instead of in the machinery compartment?"

"Look, Pete," said Gus, "when I got to the car, I checked the fuel tank and then I checked the engine oil and the coolant levels. When I got ready to start the engine, the Start button was missing. You can see the hole in the panel where it should be. I then checked to see if they had moved the button, and that was when I found the battery missing. By then I knew I'd better get someone who would know exactly what was missing."

When they reached the car, Gus tried to show Pete the empty battery box. Pete, however, immediately began to examine the engine and suddenly started to laugh. "I'm sorry I laughed, Gus, but you will too. Look here."

Pete was pointing to a device applied to the engine in place of the regular starter motor.

"So what?" asked Gus, "I don't see anything laughable."

"If you will look closer, Gus, you will see this isn't an electric starter, but a hydraulic starter. Here is the reason you don't have a battery or a Start button."

Gus still didn't see anything funny. "Why don't they stay with something standard?" he asked. "What was the matter with the electric starter? It's good enough for automobiles and other small engines. Do they just try to keep things fouled up?"

"This isn't the only thing being tried to eliminate the electric starter," Pete replied. "I understand that an air starter is also being tested. The real aim is to eliminate the battery and battery charging system."

Gus looked puzzled. "Why? What's wrong with them? Do they give that much trouble?"

"Generally starters, generators and batteries don't give much difficulty in normal service. On mechanical reefers you do encounter conditions not completely normal. Car vibration sometimes damages starter bearings. Motion of the car also affects the vibrating type voltage regulator, causing battery charging failures. The automotive type of charging generator has brushes and commutator as well as bearings and belts. Generators have frequently been located at the back of the engine where they were overlooked and were not properly maintained.

"When battery temperature is lowered, its capacity also goes down. During cold weather when lubricating oil is stiff, turning a cold engine over can be a real problem. Some cars have been equipped with high batteries—the ones hung underneath. Bigger batteries require added protection against the shocks bound to occur in freight service. Think what the last battery for your automobile cost you. Then remember that we are talking about 24-volt batteries. You will get an idea of the costs involved."

"Gosh, Pete, I never thought of that. Do you think this hydraulic starter will solve all of those problems?"

"Don't get me wrong, Gus. The battery starting system isn't all bad; it just has problems. Any time you make changes to eliminate problems, you generally get yourself some new and different problem. You must then decide which procedure is least troublesome and which gives the greatest return for your money. The best way is to try the different methods and then evaluate them.

"Some cars are now equipped with an alternator and rectifier system which takes the place of the direct-current charging generator. The alternator produces a-c which is rectified to d-c of the proper voltage for battery charging. This eliminates most of the problems encountered with the belt drive, commutator, brushes, and generator bearings. While this would appear to solve a lot of problems, it now develops that we encounter blown fuses, overcharged batteries, undercharged batteries, and rectifier failures."

"Gosh, Pete, you sound like the voice of doom," Gus exclaimed. "Help me get this engine started before I decide its just not worth it. Where's the power for this hydraulic starter? Don't tell me I have to pump it up by hand."

"You might have to," responded Pete. "Generally you won't. If it is cold weather, I'd suggest that you do it to insure plenty of pressure."

Pete pointed to the starting instruction. It read:

Ambient Temperature, deg F	Pressure Gage, Psi
Above +40	1,500
+40 to 0	2,500
Below 0	3,300

"I'd suggest you always make sure that you have at least the pressure indicated on that chart. The system has an accumulator, a reservoir which is divided into two sections by a piston. On one side of the piston you have the hydraulic system and, on the other side, a charge of nitrogen gas. As hydraulic pressure is built up, the piston will move to compress the nitrogen. When the engine runs, an engine-driven pump maintains this pressure. Provided there are no leaks in the hydraulic system, the pressure then should hold indefinitely.

"With this type of starting, the engine is actually turned over faster than is the case with the electric starter. This is an advantage in cold weather. However, a word of caution; you should get three starting cycles with a warm engine and a fully charged hydraulic system. If the engine is cold, you will have to be absolutely sure that

---

This is the sixteenth article in this series discussing the operation, maintenance and trouble shooting of mechanical refrigerator cars.

the engine is ready to be started, because you will not be able to crank and crank. If it doesn't start the first time, you will have to build the pressure back up with that hand pump, and that takes a lot of pumping.

"So," Pete continued, "if the outside, or ambient, temperature is below 45 deg, you better use a cold-weather starting aid. This is the same we use on cars with electric starters—ether in a plastic capsule or metal cartridge. It would be best to add the ether capsule just before moving the starting lever, or, if possible, during cranking."

"Wait a minute, Pete," Gus said. "What did you mean about being sure that the engine is ready to start?"

"First," Pete answered, "be sure that the stopping device, usually a pull knob or handle, is in its running position. This is generally a choke and may sometimes stick so it will not return to its normal position. Depending on the type of engine, you may have a fuel priming pump. If you have such a pump, use it to insure that fuel is reaching all of the injection system. This will conserve the starter charge.

"Those engines not equipped with priming pumps don't generally require priming, unless fuel filters have been changed. Then, regardless of the type of starter, it is always a good idea to completely fill the filter housings with fuel. Remember, no air pockets. Be sure the safety control is set for starting. It may have the engine air shut off, making it impossible for the engine to start."

"That's an awful lot to remember when you're in a hurry to get an engine started."

"No, Gus, it isn't too much. Most of these things you do automatically. Just check those things needed to make an engine run: air, fuel, coolant, lubrication, and, finally, rotation to produce ignition. You just have to be more careful. Frequently after an engine has been cranked and cranked, then we start looking for trouble. Make your checks first.

"Now, Gus, see the starting lever on this hydraulic gadget? When you move that, you do two things. You move the starter pinion into engagement with the flywheel ring gear and you open the valve in the hydraulic system. When the engine fires, close the valve quickly to conserve the hydraulic charge and to prevent the starter from over-running. You should expect that, if the engine starts, the engine-driven pump would restore the pressure charge. Why conserve it? Remember that the engine might not continue to run—it might be a false start. Your pressure would be gone and it would mean you would have to pump it back up by hand. Over-running the starter isn't good either."

Following Pete's explanation, Gus started the engine easily. The two watched it operate. Suddenly Pete turned and started away. He called back, "Here I've been fooling with you, and Big Jim will be along shortly wanting to know why I'm not done with my job on that other car."

Things were again normal. Pete was unhappy.

U.P. 8500-Hp Gas Turbines

(Continued from page 24)

partially or completely open up a turbine. The turbine casing has a horizontal split which permits removal of the top half with the turbine in the locomotive. All parts can then be removed and replaced, except for the compressor rotor blades. Three turbines were opened when failed inlet silencer parts entered the compressor and damaged compressor blading. Ten turbines were opened for scheduled inspection and modifications. Nine turbines had unscheduled openings because of turbine troubles which required immediate repair. Based on these nine unscheduled openings for 95,727 turbine hours, an average of 10,636 hours per turbine is obtained. This reflects the initial field operation of the new design turbine. With design improvements already made, this average is expected to improve.

After four failures in turbines, a program was set up to apply a new design of first-stage bucket sealing pins and second-stage bucket tie wires with crimped ends.

On March 29, 1959, the air inlet silencer of Locomotive 4 was found collapsed, evidently due to icing. A new inlet silencer was applied. No damage to compressor could be seen from the turbine inlet, and the turbine was not opened.

On April 19, 1959, the air inlet silencers on three locomotives collapsed due to an unusual weather condition which prevailed around North Platte, Neb. Weather conditions were favorable to icing of the screened opening of the inlet silencer. Ice formed gradually and eventually closed the openings in the screen. The resulting negative pressure inside the silencer caused it to collapse. New silencers were applied. Compressors were not opened, since visual inspection from the inlet end indicated that very little blade damage had occurred.

To prevent a recurrence of this type of failure, the manufacturer designed a shutter arrangement in the floor of the silencer which opens whenever the interior pressure decreases slightly and admits warm air from the carbody. These were manufactured in the railway shops and installed on all turbines.

Turbine accessories, such as fuel pump, hydraulic pump, fuel flow divider, exhaust control system, governor, lube oil pumps, atomizing air compressor, and vapor extraction blower, have performed quite well. There have been some road failures and delays.

Caps, liners, and transition pieces in the combustion chambers were not provided with serial numbers, and no accurate record can be kept. At the present, liners and caps are repaired at approximately 1,600-hr intervals, and transition pieces at 5,000 to 7,000 hr intervals. All are repaired by building up with welding, or by welding in new sections.

After starting on diesel fuel, automatic transfer is made to a specification type residual fuel having a viscosity of approximately 95 SUS at 210 deg F. Specifications provide that the weight ratio of sodium to vanadium be kept below 0.3, and the weight ratio of magnesium to vanadium above 3.0. Turbine performance on this type of fuel has been excellent. There has been no evidence of corrosion of hot gas parts due to fuel.

These turbines operate with a very clear exhaust, a marked improvement over the 4,870-hp turbine. In spite of limited space, the inlet air silencer does an excellent job of reducing the noise, with a minimum of pressure drop. Noise level at full load operation is comparable to a 3-unit diesel locomotive.

Vol. 4, No. 1



Railway Executive News

Published by Railroad Products Division, SERVO CORPORATION OF AMERICA
Copyright 1961 Servo Corporation of America
111 New South Road • Hicksville, Long Island, New York



SERVOSAFE® Hot Box Detective* here signals train crew automatically, if overheated journal bearing is detected on passing freight at **remote spot on main line.**

Automatic Alarm Patent Issued to Servo Corp.

Patent no. 2,963,575 covering automatic alarm hot box detection devices was issued Dec. 6, 1960 to Servo Corporation of America by the United States Patent Office.

The new patent covers a variety of computation and comparison methods for ascertaining and identifying hot box signals emerging at the output end of the detection devices.

Granting of this latest patent now protects with *three* patents various infrared detection systems pioneered and marketed by Servo Corp.'s Railroad Products Division.

The automatic alarm, according to Servo railroad spokesmen, represents one of the most significant developments in hot box detection since Servo marketed the first successful SERVOSAFE® Hot Box Detective* system in 1956.

This important railroad safety device, known commercially as SERVOLARM® equipment, has been incorporated in various Detective installations for several years.

It allows Detective systems to be used for automatically setting signals to stop trains with hot boxes and gives the railroads a broader choice of systems employing standard chart recording interpretation techniques or automatic control, depending on detector location and individual railroad requirements. ■

*Protected under one or more of the following U.S. Patent Nos.: 2,880,309, 2,947,857, and 2,963,575. Other U.S. and foreign patents pending.

FASTER FREIGHTS:

Railroads Straighten Track, Reduce Stops, Add Detectors to Speed Up Service...

"In the rugged mountains of northern Arizona, Atchison-Topeka & Santa Fe Railway workers are hurriedly laying the final sections of a new 44-mile strip of track that will slice through this region, unwinding sharp curves, and flattening steep grades.

"Farther north, Chicago & North West Railway freights now roll non-stop through fifty small towns between Chicago and Rapid City, S. D.

"To the east, Chesapeake & Ohio Railroad crews plant small metal boxes containing super-sensitive infrared heat detecting systems in roadbeds along sections of the line's track. The aim is to spot 'hot boxes'—overheated wheel bearings—before they cause time-consuming breakdowns.

"These seemingly unrelated events, separated by hundreds of miles, are aimed at a single objective: a further speedup of rail freight. Taking kinks out of winding track, scheduling fewer stops, and installing better equipment are three of the major methods the nation's railroads are using to achieve faster freights."

* * *

"The Chesapeake & Ohio and other railroads have eased the problem of delays caused by hot boxes by installing the special infrared hot box detection systems along sections of track. These devices, which sense the heat generated by a hot box, flash the danger signal to the nearest terminal, which relays the message by radio to the train's engineer.

"Thus, before serious trouble results, the engineer can stop the train or slow it down and avoid the even greater delay caused by a broken axle or fire. The C&O has 17 of the devices in service and plans to add another dozen in the near future."

THE WALL STREET JOURNAL
Dec. 16, 1960

The Atchison-Topeka & Santa Fe and Chesapeake & Ohio are two of the 28 major Class I railroads across the country that have adopted the patented infrared SERVOSAFE® Hot Box Detective* system for spotting dangerously overheated journal bearings on fast freights.

First railroad to install the Detective back in 1956, the C&O has found that even smokeless hot boxes on trains traveling at high speed cannot escape spotting by SERVOSAFE.

"I consider the Hot Box Detective to be one of the greatest aids to railroading in many, many years," C&O Vice President for Operations M. I. Dunn has stated. "Our tests have proved it 100 per cent effective."** ■

**CHESAPEAKE & OHIO RAILROAD
1958 Annual Report

RAILROADS REPORT:

Spot 20 hot boxes at one spot alone...

Writing in the *L&N Magazine* (Dec. 1960) on the railroad's experience with its SERVOSAFE® Hot Box Detectives*, Edison H. Thomas states: *"...just how effective the system is can be judged by the fact that the automatic (Detective system) at Cullman (Ala.) alone has spotted 20 incipient hot boxes, any one of which could well have caused a derailment had it not been discovered and corrective measures taken."*

Efficiency as high as 100%...

Railroads using the SERVOSAFE Hot Box Detective report better than 90 per cent efficiency for the units...in some cases as high as 100 per cent for consecutive periods of six months or over.

Savings over $100,000...

One SERVOSAFE road reports savings of over $100,000 per installation per year, allowing amortization of the equipment in approximately one month's time.

'Wheel Checker' Sales Now Handled by Servo

Servo's Railroad Products Division has been granted exclusive worldwide sales rights for the *Wheel Checker,* a division spokesman announced.

System automatically detects broken wheel flanges and loose wheels on passing cars, squirting a shot of non-drying bright yellow paint on the wheel for quick identification. ■

3 SIMPLE STEPS TO REDUCE YOUR HOT BOX PROBLEMS

Any one of these steps will contribute to relief from the hot box problem . . . will help improve journal bearing performance and cut operating costs, too. Together, the indication is so promising that the feasibility of a 48-month repack period is now being tested.

Want proof? Try these quality Brake Shoe products to upgrade the bearing performance of your cars—see for yourself what they can do when the going is rough. For full details consult American Brake Shoe Company, Railroad Products Division, 530 Fifth Avenue, New York 36, New York.

A-1897

AMERICAN Brake Shoe COMPANY

Quality products cut your ton-mile costs.

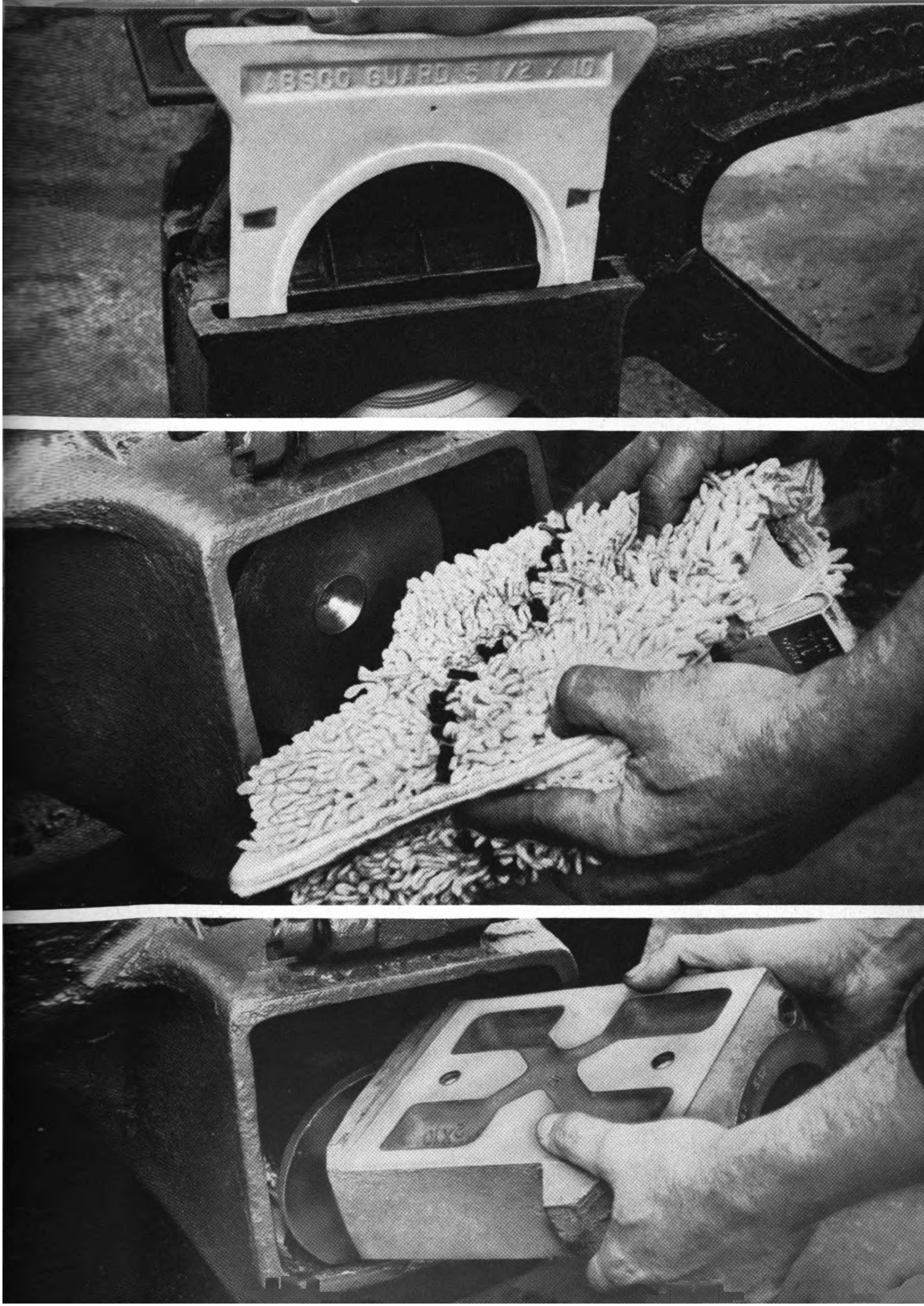
1 Keep oil in box. New Absco dust guard helps keep oil in, dirt and water out. Engineered for long life. Fills the well . . . doesn't drop down onto journal when axle shifts laterally, doesn't get damaged when axle moves back. Yet it can follow under severe impact or misalignment.

2 Feed oil to bearing. Improved Absco lubricating pad* holds and feeds ample quantities of oil under all operating conditions. Simple, economical, durable, easy to install and remove. Can be effectively renovated for long life.

*A.A.R. conditionally approved.

3 Stabilize journal assembly. A quick, simple method is to install the Absco positive control flat back bearing† in place of the conventional steeple back bearing. No alteration or modification to the box or axle is necessary. Proved effective in road tests extending over the past 36 months.

†A.A.R. approved for limited application for test in interchange service.

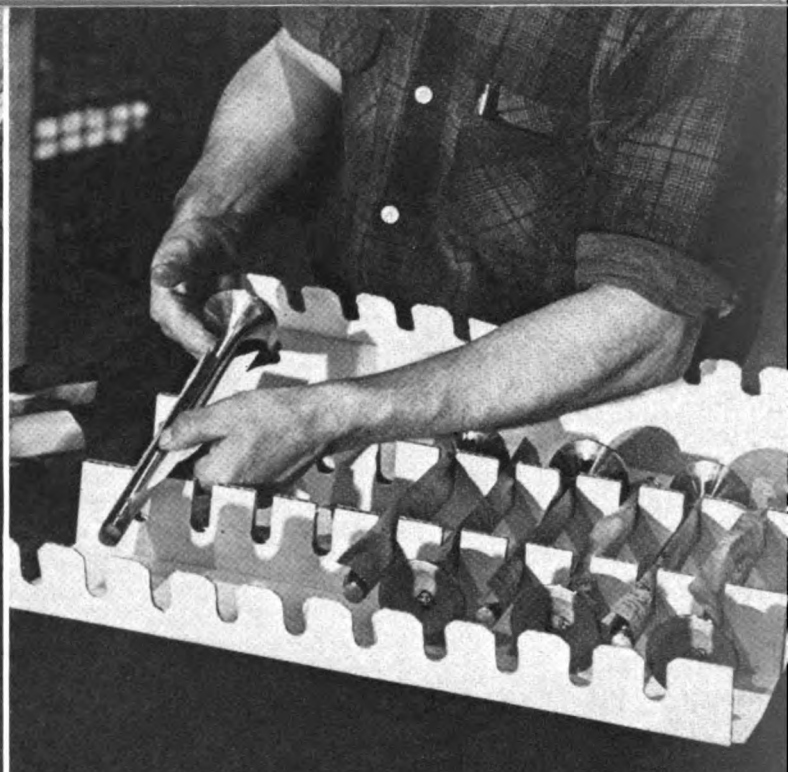

ABSCO GUARD S 1/2 / 10

"Electro-Motive's new '50' pack keeps valves in perfect condition always ready for immediate use, and far easier to reship, handle and store."

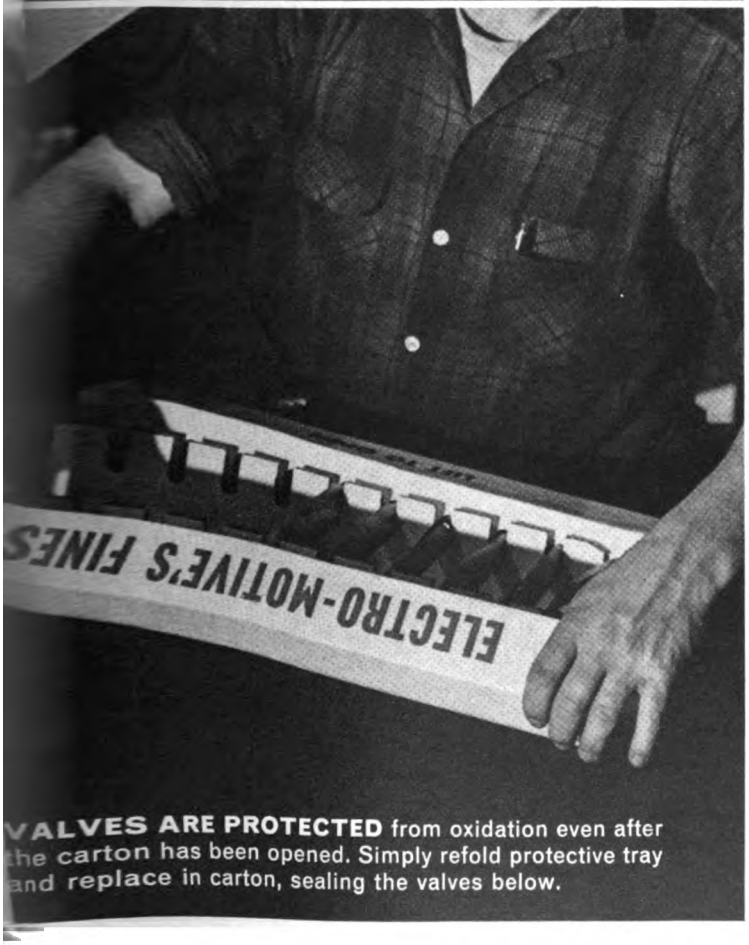




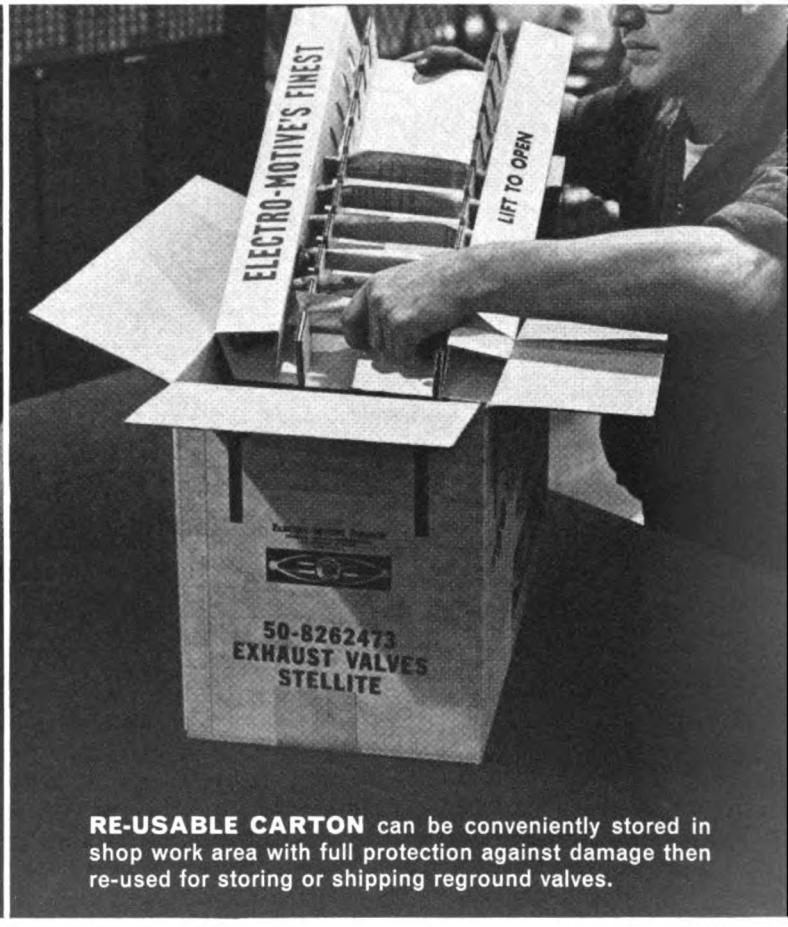
NEW, COMPACT CARTON contains fifty exhaust valves. These are proven Electro-Motive valves that make engines run smoother, perform better, last longer.



SHOCK RESISTANT TRAYS hold ten individually supported valves wrapped in protective VPI rust preventive paper. EMD exhaust valves are ready for immediate use.



VALVES ARE PROTECTED from oxidation even after the carton has been opened. Simply refold protective tray and replace in carton, sealing the valves below.



RE-USABLE CARTON can be conveniently stored in shop work area with full protection against damage then re-used for storing or shipping reground valves.

61 R-9

GENERAL MOTORS LOCOMOTIVES

Immediate shipment can be made from nine strategically located Electro-Motive Branches. Call your nearby Electro-Motive Representative for complete information.

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In Canada: General Motors Diesel, Limited, London, Ontario

EMD Field Loop Can Be Eliminated

Arrangement increases performance reliability and makes possible more braking in the low-speed range.

The field loop circuit on General Motors diesel locomotives makes it possible for enginemen to select the amount of dynamic braking ncessary during m-u operation. This circuit, trainlined between units, consists of the main generator battery field of each unit connected in series to the low voltage supply of the lead unit.

This arrangement was ideal when dynamic braking was first applied to diesel-electric locomotives, but changing locomotive requirements and improved techniques have changed this. A new and more reliable system eliminates interlocks, power-plant jumpers, and other hardware, while also improving performance.

Today, there is no need for the field loop circuit; it is actually a design and operating handicap. It has already been eliminated by one railroad; another is moving toward the same goal.

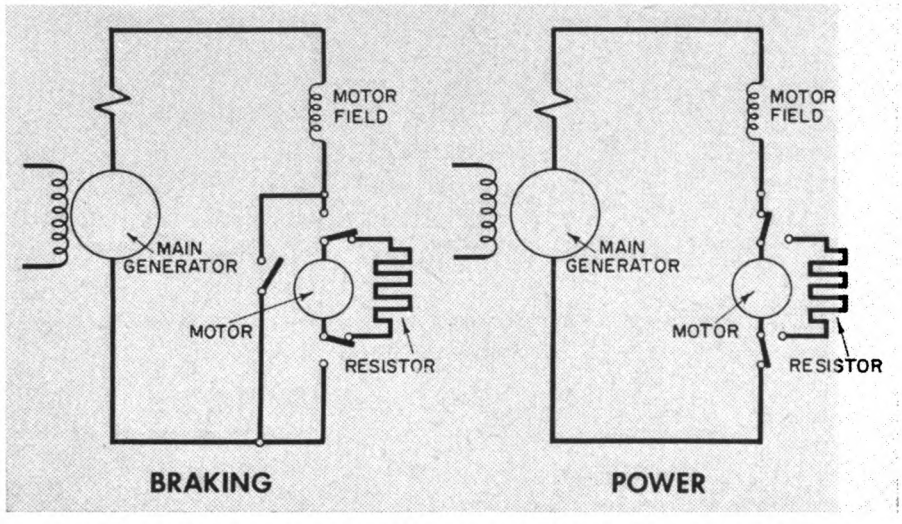
The field loop can be eliminated and the performance can be improved. To utilize motive power effectively, railroads need to operate units in multiple. These can be units turned out by different manufacturers, or different models from the same builder. Except for dynamic brake operation, compatibility is easily and economically achieved. The field loop circuit, peculiar to EMD locomotives, presents the only major difficulty.

Dynamic braking, the use of electric traction equipment to exert a retarding force, is an elaboration of the elementary arrangement consisting of one generator and one motor. There is no provision for regulating dynamic braking or power. For braking, the motor armatures must be connected to a load and the motor fields to a source of current for excitation. Excitation is provided by the main generator. The method of exciting the main generator in power operation affects dynamic brake excitation control.

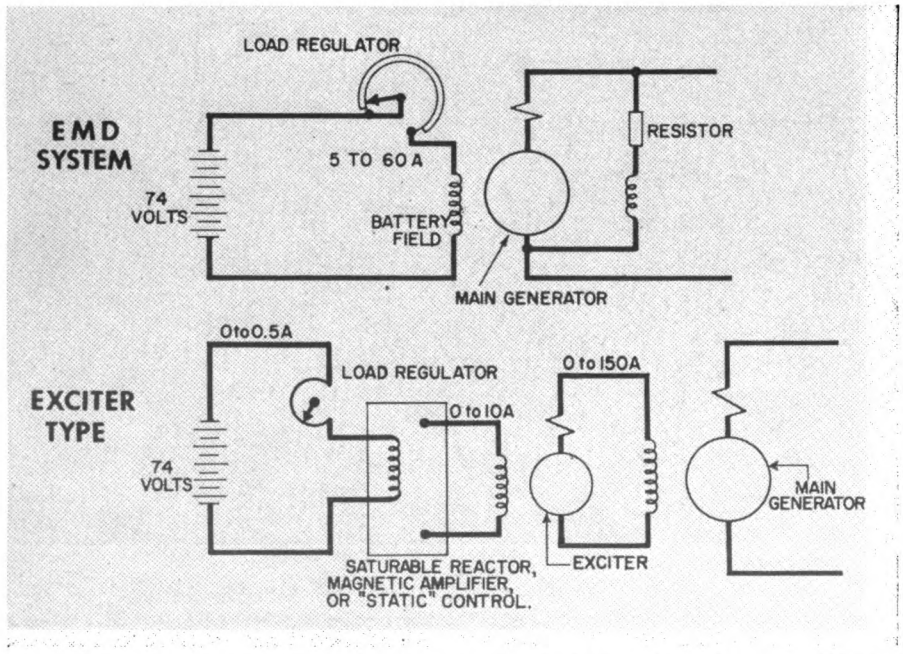
There are two general types of locomotive excitation systems. In the EMD system, the generator is both self and separately excited. Practically all other locomotive generators have only separate excitation. Because less power is required for the separately excited (battery) fields in the EMD system, it is practicable to use a rheostat for control while they are connected to the 74-volt auxiliary power system. When the main generator is only separately excitated, excitation current can come from the machine's own exciter. Generator output is then regulated by controlling the exciter field. It is common practice to use saturable reactors in this exciter field circuit, reducing the signal to extend control of the main generator output.

The EMD main generator excitation system had been used successfully

Article prepared by Electro-Motive Division, General Motors Corp.



Basic electric transmission on diesel locomotives can be adapted for dynamic braking.



Dynamic braking arrangement on EMD locomotives has differed from that used by other builders.

for a considerable time before dynamic braking became well accepted and widely used. For suitable dynamic brake control using the main generator to excite the motor fields, only the main generator's battery field is needed and a 15-amp current is sufficient. Each generator should have the same excitation. Four-unit consists were considered the largest practical locomotives when dynamic braking was first adopted. All these factors led to adoption of a field loop circuit which would connect the battery fields in series for dynamic brake excitation control. The result was that only the EMD design required a special circuit to handle the current and also a control rheostat of rather large capacity.

For systems utilizing exciters, control systems can be so small that there is no problem of supplying several circuits in parallel from a potentiometer in the engineman's control stand. This arrangement is known as the variable voltage system. Current capacity of the basic trainline wiring is also very adequate.

For a non-EMD unit to control an EMD unit in dynamic braking, the potentiometer capacity must be increased so that it can handle the 15 amp required by the EMD units, and the unit must also carry all the hardware associated with the field loop circuit. All EMD units can be modified so that non-EMD units will operate normally when trailing by making only minor circuit changes on the EMD units.

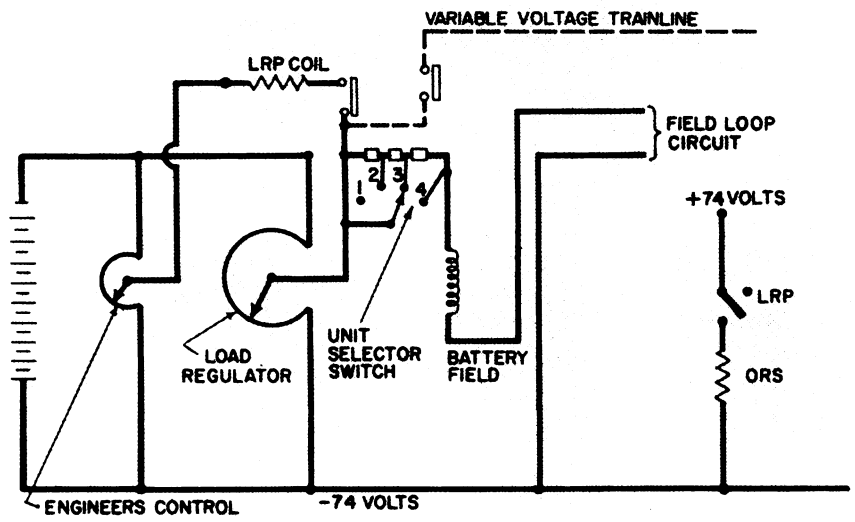
About a decade ago, EMD began to utilize the load regulator on some models for excitation control during dynamic braking as well as during power operation. When the new square controller came into use, the lead unit load regulator was utilized for control of the field loop circuit. A very small potentiometer in the control stand sets up a reference which the load regulator matches through the operation of a sensitive relay, designated LRP on late model wiring diagrams, and a load-regulator control valve ORS. This system can be arranged to energize a variable voltage trainline (broken lines on the diagram). The circuit is capable of supplying more power than the trainline can handle, but is inoperative if the engine is shut down. All units equipped with the square controller have the components necessary for this arrangement. These can be rearranged so that the field loop circuit is not required for dynamic brake operation.

While nothing needs to be added to convert an EMD unit equipped with the square controller from field loop to variable-voltage control, it is logical to ask about the older A units equipped with the original controller, and B units which have no controller. Such units from the F3, introduced in 1947, to the latest models are equipped with the load regulator control valve. For A units, the small LRP relay and circuitry would be required. For B units, the LRP relay and battery field current limiting resistors would be required.

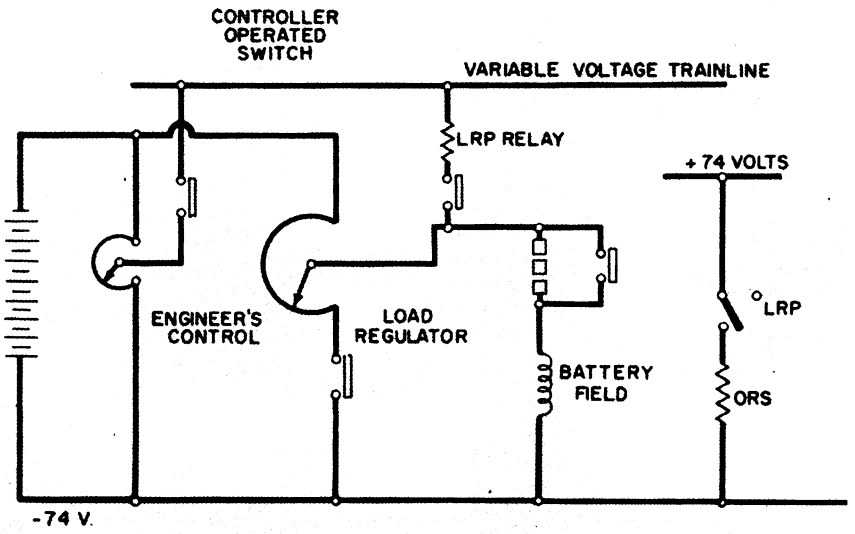
Elimination of the field loop has several advantages. Reliability of performance is increased, because there are fewer contacts in the excitation circuit. With the field loop system, the maximum value of the motor field excitation is limited by the excitation of the generator, not by the capacity of the motor fields.

The variable voltage system permits greater peak braking at lower locomotive speeds. With the field loop, low-speed braking is seriously affected when more than four units are used in a consist. This is not true when the variable voltage system is used. Maintenance will be reduced by elimination of the field loop cable between units. Operation will be simplified because there is no unit selector switch.

Conversion to variable voltage control is easily done for one unit or an entire fleet. Fail-safe features of full brake, partial brake, or no brake can be arranged.



Use of load regulator control for EMD dynamic braking simplifies elimination of field loop.



Conversion of older A units and all B units does require additional control components.

Out of Sight, Out of Mind

By Gordon Taylor

On a recent trip an expensive train delay and diesel engine failure came to my attention. It could have been avoided had the maintenance people done something about an engineman's report of low lube oil pressure. Later on the same trip, a friend on another road told me of his problem—worn out and neglected storage batteries. I dare say one would find that insufficient preventive maintenance is spoiling locomotive performance and increasing costs for many roads. What's happened to preventive maintenance? Has it gone out of style?

The battery trouble mentioned above reminds me of a similar case on another line. Both situations involved locomotives which are maintained at central maintenance shops. From these system shops, the units are sent out for service on branch lines where there very limited maintenance facilities and few maintainers. Locomotives are to perform tours of duty with very little maintenance, finally being worked back to system diesel shops where they can be carefully and completely inspected, cleaned, serviced and repaired.

There should be no reason why locomotives cannot be operated under such a plan, *if they receive proper attention when they reach the maintenance shop.* In both cases the system repair shops was sending out units that had not received adequate preventive maintenance.

Let's consider for a moment storage battery maintenance. While a battery is by no means the most expensive component of a diesel locomotive, it is certainly one of the most important. It costs about $1 per day just to own a 32-cell storage battery, plus the cost of a reasonable amount of care. A storage battery is such a simple thing that most people think it should take care of itself. Being housed out of sight, it is usually out of mind until it fails to start the engine. While a battery actually requires little care, proper maintenance is essential. The storage battery should receive the same careful attention given to all other valuable electrical equipment. Long, dependable battery performance will be obtained by careful observance of a few simple rules:

- Be sure the battery compartment is well ventilated. A free flow of outside air over and around the battery helps to dissipate heat, preventing excessively high operating temperatures. A well-ventilated compartment promotes long battery life. Screens over the ventilator openings should be kept clean and should not be allowed to fill with paint or dirt.
- See that all circuit and bolted connections are clean and tight and are maintained in that condition.
- Block the battery trays into place securely, but do not wedge.
- Maintain proper battery charge by adjusting the voltage regulator to conform with the working schedule of the locomotive and the needs of the battery.
- Keep the battery, its connections, and surrounding parts clean and dry. Vent plugs must be securely locked in place, except when taking specific gravity readings. All vent plugs are provided with small openings for the escape of gases which form during charging. Clogged openings may cause sufficient gas pressure within the cell to break the seal betwen the jar and cover. If, during inspection, these openings are found clogged with dirt, they should be immersed in water and thoroughly cleaned. It may even be necessary to use a piece of wire to clear the openings.
- Keep a record of battery condition and the charging equipment at each inspection. The health of a lead-acid storage battery is most accurately determined with a hydrometer, checking the specific gravity of the electrolyte. This gravity reading varies directly with charge, accurately reflecting battery condition. The hydrometer is as useful to the battery maintainer as a thermometer is to a doctor.

For many, these simple instructions are "old stuff"—so basic that they deserve no further consideration. That's probably the trouble. Maintainers feel that such simple practices are not worthwhile. The result is insufficient preventive maintenance, then time-consuming delays, and, finally, higher repair costs.

Let's see what happened to batteries on locomotives of two railroads which have come to my attention recently.

Case 1. A locomotive was sent out from the system maintenance point for service on a branch line. The local maintainer noticed that the battery seemed to be charging at an excessive rate. He tried to adjust the voltage regulator, but was unable to do so. The next day there was an explosion in the battery compartment which blew off several cell covers and broke a battery tank, causing it to leak. It was necessary to transfer the locomotive 200 miles back to the system maintenance point. There it was found that the explosion had resulted from a combination of defects: an improperly ventilated battery compartment (clogged ventilator screens), high charging rate (liberating hydrogen gas), and loosened battery connectors, which produced the spark that exploded the gas. Proper preventive maintenance would have avoided all this.

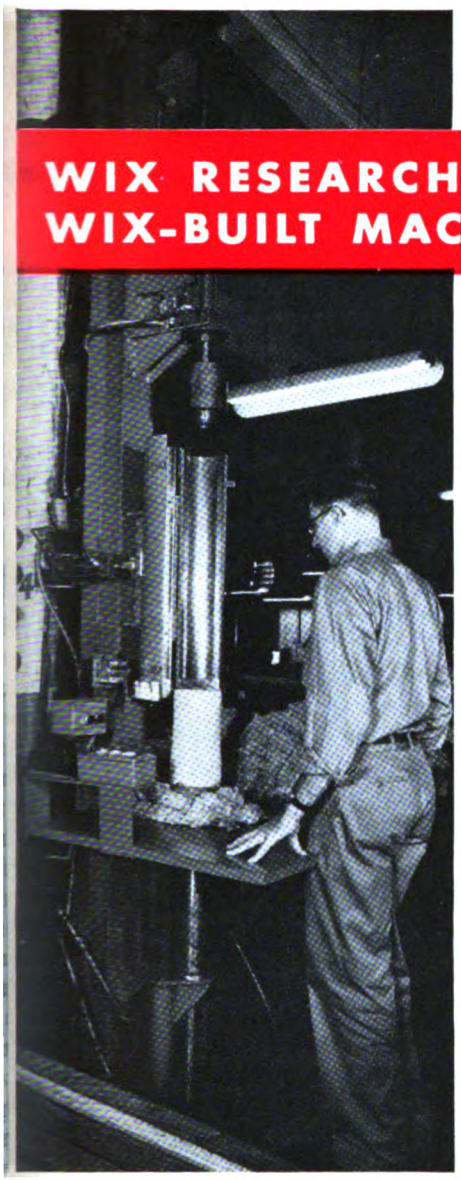
Ironically, the unit sent as a replacement also had loose battery connectors. Fortunately, they were found and corrected before they could also cause a failure.

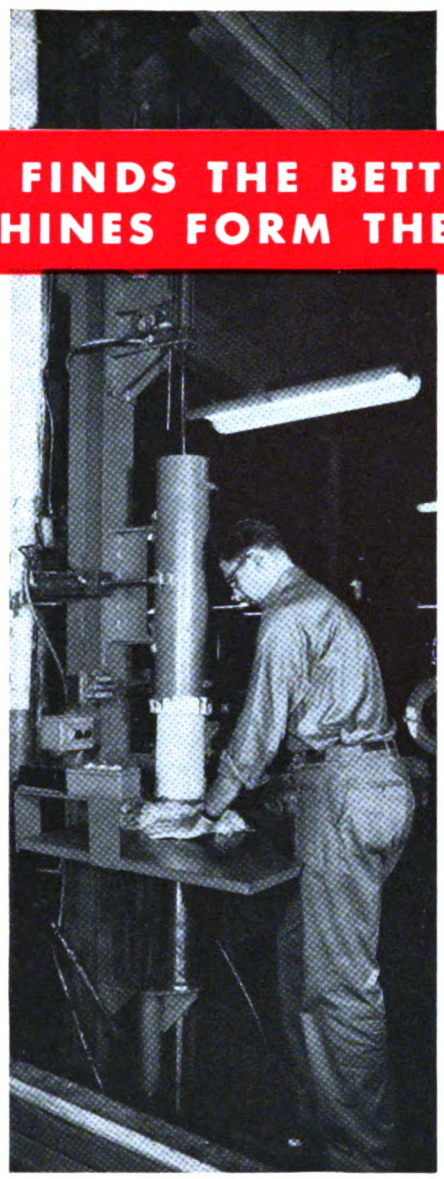
Case 2. On this railroad, a locomotive battery was found to be too weak to crank the diesel. To start the engine without delay, heavy emergency starting cables were connected from the battery on a nearby locomotive to the starting circuit on the crippled unit. While the first unit was being started, one of the battery connectors on the second unit became loosened and the spark produced an explosion which blew off several cell covers and sprayed acid on the maintainer. Here was just another case in which an improperly ventilated battery compartment and a loose con-

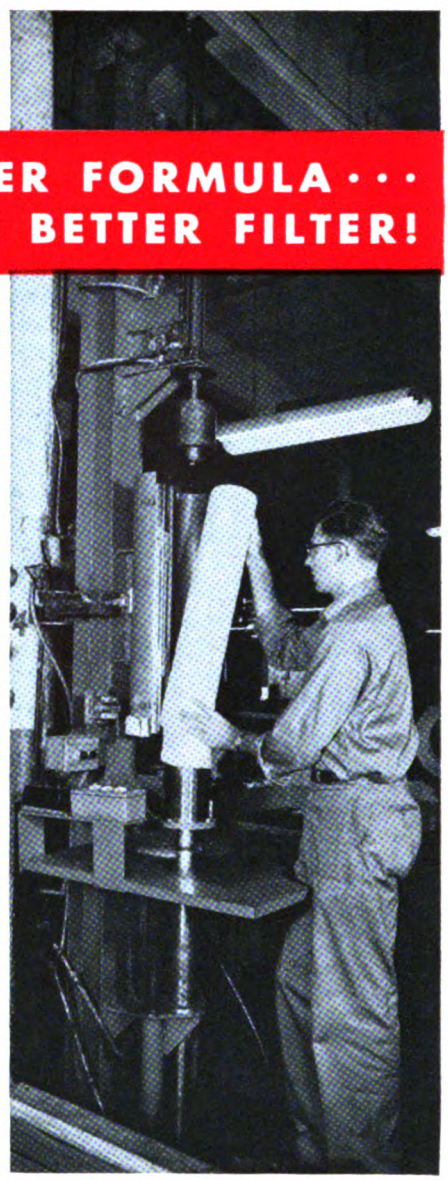
(Continued on page 44)

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(Continued from page 42)

nector got together for a big blowout. A weak battery on one unit was the indirect cause of a repair job on another.

Case 3. We'll now consider a different type of battery trouble that occurred on the latter road. A cold spell brought temperatures to zero. Mechanical department headquarters contacted maintenance points, warning that steps should be taken to prevent frozen air lines and to check locomotives so there would be no frozen radiators, frozen engines, or frozen batteries.

"Who ever heard of a battery freezing?" a general foreman asked upon receiving the warning about batteries.

"I never heard of a fully charged battery freezing, because a battery with electrolyte of 1.250 specific gravity has a freezing temperature of 62 deg F below zero," his supervisor replied. "But I know that discharged batteries can be damaged by freezing. A battery with 1.150 gravity will freeze at 5 deg F above zero, and a battery with 1.100 gravity will freeze at 19 deg F above zero. Check batteries on all units that have been standing outdoors for the past two days and phone me."

It was a rather embarrassed general foreman who called two hours later to say he had found two sets of frozen batteries with several cracked and leaky battery tanks.

Many locomotive maintenance people give little thought to their storage batteries. In this case, a foreman learned the hard way that batteries should never be left standing in a completely discharged condition at any time, but especially during cold weather.

Batteries also need protection against high temperatures. Normally, electrolyte temperature may run up to 15 deg F higher than that of the battery compartment. The limit is usually considered to be from 110 to 115 deg F. Even this would be harmful if it continued. Such high temperatures can be produced when charging at too high a rate, a result of having the voltage regulator set too high. High temperatures may result from improper ventilation of battery compartment. Do not use an open flame for inspection of batteries and do not place on the battery any metal object that might create a spark. A gas-filled battery compartment is as quick acting as a firecracker with a very short fuse. High temperatures distort and buckle the lead plates and soften and distort the cell jars and covers.

A clean, dry battery is usually an indication of good maintenance. Like everything else about the locomotive electrical system, it is important that the storage battery, its connections, and surroundings be kept clean and dry. If dirt or acid-soaked mud accumulates on the battery, it will eventually cause trouble. Spilled electrolyte never dries or evaporates. It destroys the wood floor or lining of the battery compartment and corrodes metals subject to attack by sulphuric acid. Current leakage paths to "ground" can be established. These are bad for any control system.

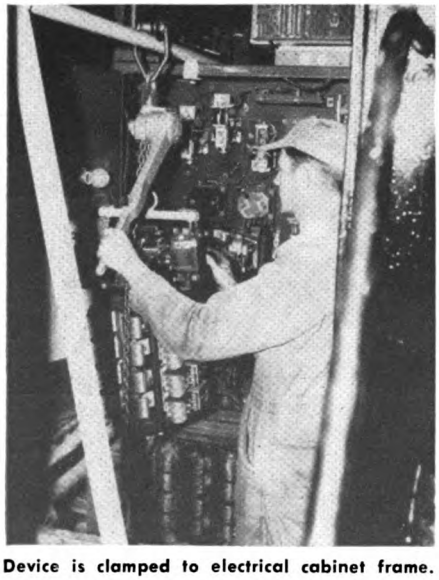
During regular inspections, dry, but dusty, batteries should be rinsed with water at moderate pressure. In freezing weather, if there is not sufficient time for drying in the shop, low-pressure air should be used to blow off surplus water. Do not use steam or high pressure air for cleaning and drying; they remove protective grease from grease seal nuts on the posts. Increase water pressure to wash out battery compartment and to move dirt from under battery trays. This will help prevent "grounds."

Keep the battery clean; keep connections tight and clean. Electrolyte level must be properly maintained by adding water from an *approved* source. See that the battery compartment is well ventilated and that the voltage regulator is adjusted to maintain the proper charging rate. Do this and the battery will reward you with added years of dependable service life. Preventive maintenance really pays its way and may mean that someone isn't caught far from home with his battery down.

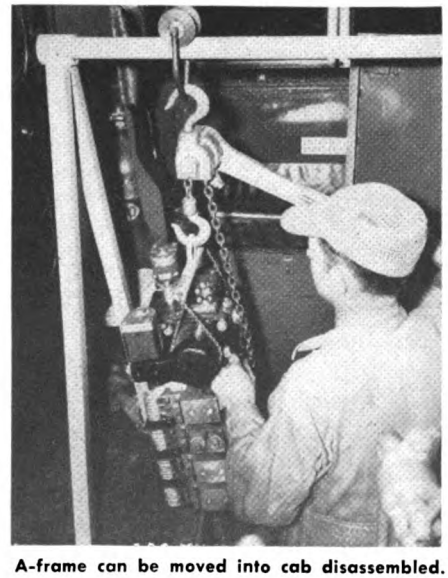
If preventive maintenance is worth while for batteries, then think of the savings that can be made on components, such as engines, generators, and traction motors, that are a great deal more expensive. On this subject Doc Watts has a maxim that I think is worth repeating: "He who starts cutting corners on diesel maintenance may soon find himself running in circles, trying to overtake dependable performance while being pursued by a pack of failures."

Simplified Contactor Removal

Illinois Central uses special A-frame for removal and replacement of switching reversers and power contactors. Points which make heavy repairs to switchers have these devices. The 2-in. horizontal pipe which forms a tramrail for the chain hoist has a bracket and set screw, 12-in. from the end, which is used for clamping the device to the electrical cabinet frame. This 56-in. pipe is supported at its outer end by two 48-in. legs. The device is put together with bolts so it can be disassembled readily. Heavy electrical components formerly were removed by hand or with improvised hoists. The new arrangement speeds these operations.



Device is clamped to electrical cabinet frame.



A-frame can be moved into cab disassembled.

(Continued from page 8)

from contact pressures decrease directly with decreases in wheel load, but more than in direct proportion with an increase in wheel diameter. An increase in wheel diameter is more effective than a decrease in wheel load in limiting the contact stresses.

Wheel-load limits, as related to wheel diameter, have been given intensive study by the American Railway Engineering Association's Rail Committee, by the AAR Joint Committee on Relation between Track and Equipment, and by the AAR Research Center staff for the past 20 years. A recommendation covering the relationship between wheel load and wheel diameter was made to the AAR Mechanical Division in 1959 (RL&C, July 1959, p 23). Limits were:

Wheel diam., in.	Load per in. of diam.	Wheel load, lb
33	800	26,400
36	810	29,200
38	820	31,200
40	825	33,000
42	830	34,900

The Mechanical Division subsequently included in Interchange Rule 3: "Cars of over 70-ton normal capacity up to and including 100-ton nominal capacity built new on and after January 1, 1961, shall be equipped with steel wheels of at least 36 in. nominal diameter when four-wheel trucks are used."

Today, some railways are using and accepting in interchange wheel loads 10% in excess of the AAR established load limits. This means that cars having 6½-in. by 12-in. journal bearings and 36-in. diameter wheels are being operated over rail with 276,100 lb—about 34,500 lb per wheel, or 960 lb per in. of wheel diameter.

"As one who has striven for 23 years to improve rail design and metallurgy, to reduce rail failures, and to prolong the life of rail," Mr. Magee commented, "I am seriously concerned about the effects that such heavy wheel loads will have upon rail damage, rail failures, and rail life. The total investment in rail for Class 1 railways in the United States is about $2 billion. At present-day prices, it would cost on the order of $7.5 billion to replace all rail in main-line track.

"Certainly, I have no wish to oppose any progress that is for the overall good of the railway industry. I realize that there are many considerations to be taken into account. These include the cost of car construction and repair, per diem, mileage allowances on non-railway-owned cars, costs of road haul, track and structure maintenance, cost of switching and accounting, and effect on attracting additional traffic."

Based on 1957 figures, Mr. Magee estimates average carload expense and revenue figures to be:

Revenue		$260.80
Switching and accounting	$30.10	
Car repairs	16.03	
Transportation	36.40	
Maintenance of way	13.95	
Fixed operating expenses	85.02	
Taxes	25.60	
Total expenses per carload		207.10
Net operating income		53.70

Mr. Magee then speculates on the extent to which operating expenses could be reduced by increasing car capacity, making it possible to reduce rates with the hope of attracting additional traffic.

While certain operating expenses, such as switching costs and accounting, vary directly with the number of cars or shipments handled, others, such as car repairs, would be increased with an increase in car capacity but not in a direct ratio. Road-haul costs would be increased almost in proportion to the increase in car capacity and weight. Maintenance-of-way expenses, at least for some items, would be increased more than the percentage increase in car capacity and weight. Other operating expenses are fixed, or not actually influenced by the amount of traffic or number of cars.

"If we were to double the car capacity and handle the same traffic with one-half the number of carloadings," Mr. Magee states, "we would save one-half the switching and accounting costs. Assuming that savings in car repairs would be offset by added costs for maintenance of track and structures, the reduction in operating costs would be $30.10, or approximately 6% of the $521.60 revenue for a car with twice the capacity. Net operating income would be increased by 27%. A reduction in rates of only 6% would eliminate this increase in net operating income unless additional traffic were attracted.

"If principal savings in operating expenses with heavier cars are in switching and accounting costs, could this saving not be effected as well by offering the same 'load incentive' rates for two 50-ton cars operated as a unit in lieu of one 100-ton car? Maintenance, interest, depreciation, and terminal inspection costs would be somewhat greater for two 50-ton cars than for one 100-ton car. However, we would not be overloading the journal bearings, axles, wheels, rail, ties, roadbed, and bridge structures. And we have 50- and 70-ton cars available so that such a service could be offered now on an extensive basis. The construction of new 90- or 100-ton cars could only be on the basis of a relatively few per year, so that only a limited service could be offered with them for several years.

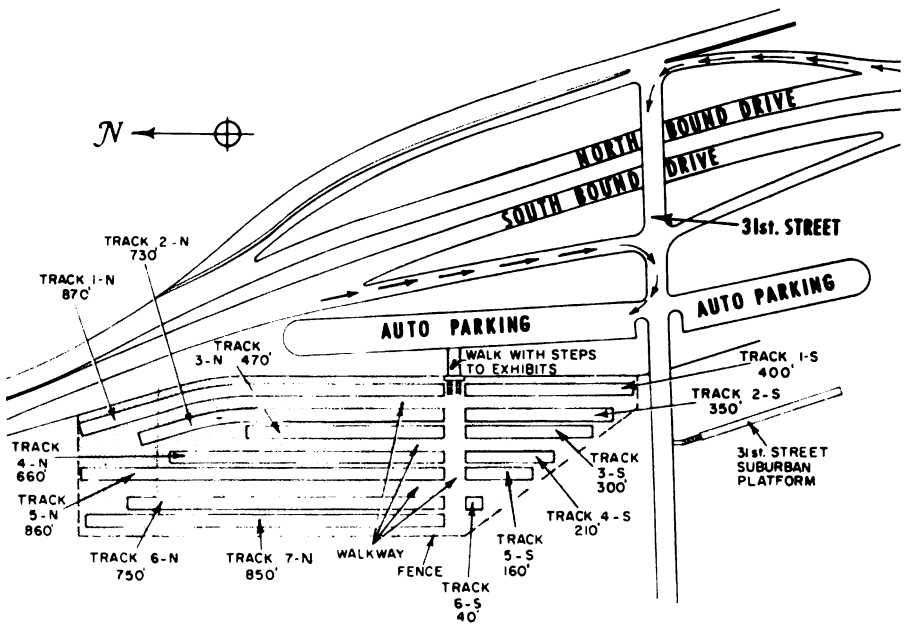
Freight-Car Roller Bearing Installations Near 100,000

Roller bearing installations on U.S. and Canadian main-line freight cars in 1960 totaled 24,801, according to data furnished by Hyatt Bearing Div., General Motors Corp.; SKF Industries, Inc., and The Timken Roller Bearing Co. This is almost double the number of car sets (12,453) applied in 1957, which was the previous high for freight-car installations. From 1939, when the first roller-bearings were applied on 9 box cars, through 1960, 97,724 installations had been made. On January 1, 1961, total freight-car ownership on U.S. Class I roads was 1,661,577, and on Canadian roads, 182,569.

AAR Revises Solid Bearing

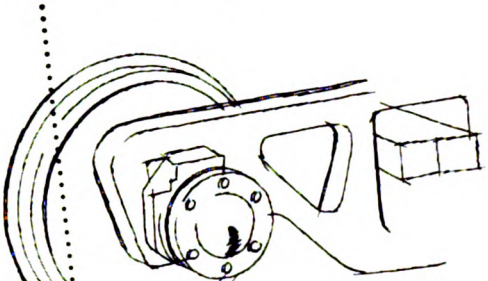
Difficulties experienced with applications of H type standard solid journal bearings under old wedges have led to the approval of an I-type which will supersede the H. The raised pad on the H bearing, introduced last year (RL&C, April 1960, p 5), does not always function properly when the wedge has ridges or a very rough bottom surface. Many cases were found where there was little or no free lateral movement between the tops of H bearings and the bottoms of bad wedges. This resulted in undue wear at the ends of the bearing. Most overheating was at the outboard end.

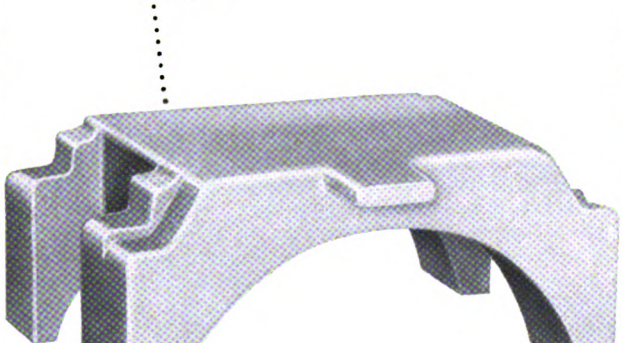
The General Committee of the AAR Mechanical Division has approved the new design with a decrease of ⅛ in. in length on the lug end as compared with the H type (Dimension E). Area of the raised loading pad on the I bearing is increased by making the pad width the same as that of the flat top surface of the bearing. Top surface width (D dimension on the AAR Manual plate D-24) will be decreased ⅛ in., making



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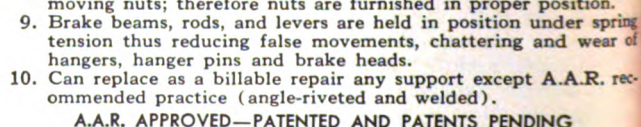
1. One design fits both 5'-6" and 5'-8" wheel base trucks.
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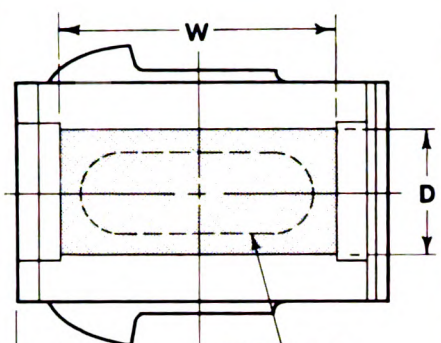
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Shaded area indicates surface of I bearing which now transmits load from bearing to wedge. Dotted line surrounds area of loading pad for H bearing. Lug location has also been changed.

it the same as that on the G-type bearing, which was replaced with the H.

The words "flat and" are being eliminated in the note reading: "Wedge seat pad to be flat and parallel with lining bore to 0.015 in. max." A new note is added: "Wedge seat pad area shall be flat within 0.025 in. in accordance with Section 8(b) in Specification M-501." Specification M-501 has called for 0.015 in. flatness. This tolerance is being increased to 0.025 in. because of the increased size of the raised pad.

Manufacturers have started to convert their plants for production of the new bearing. A joint subcommittee, consisting of representatives of the Arbitration, Car Construction, and Lubrication Committees, has been named to make a study of journal bearing wedges and determine what action is to be taken. The Committee will review practices and make recommendations for improvements in the wedge and journal box assembly which can be accomplished without financial burden on the car owners.

Another special study is being made of the center-to-center dimensions of side frames in trucks. It will be determined if wear or other conditions alter this relationship so that the excessive end wear found on some of the H bearings results.

Letters to the Editor

Copper Penetration

TO THE EDITOR:

The paper—"New York Central Research Shows Turning Removes Copper Penetration" (RL&C, February 1961, p 34)—by T. R. Fredriks, manager-applied research, New York Central, is a valuable and timely contribution to the knowledge concerning axle performance under the conditions of journal overheating. This excellent paper concludes that axles can be properly reconditioned, and safely used, by turning down overheated journals by 0.0625 in. with the work verified by Magnaglo. This procedure would be in lieu of arbitrary scrapping as has been suggested by some railroad mechanical departments.

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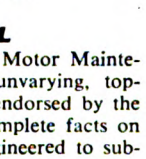
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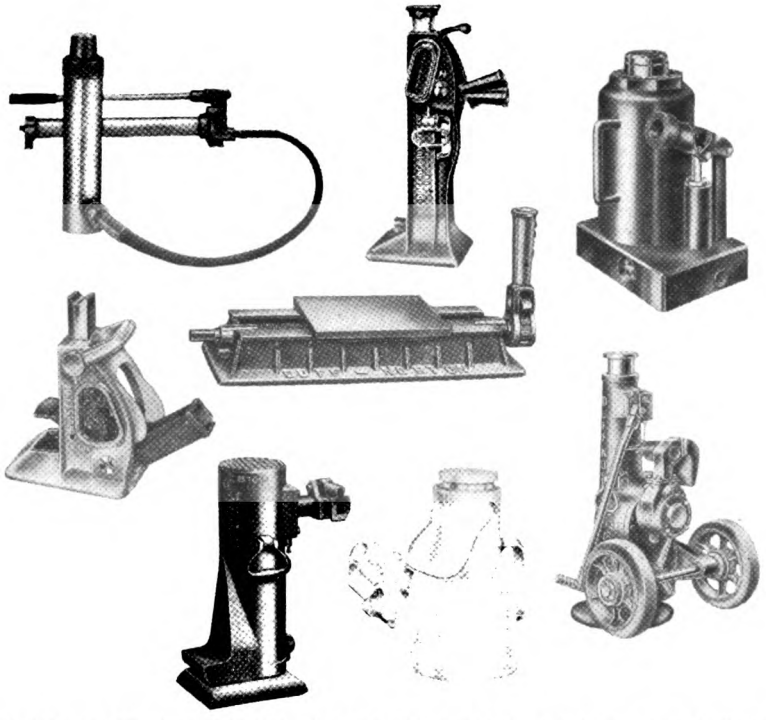


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it confirms the existence of copper penetration—"Copper penetration is the result of conditions that cause copper from bronzed-backed journal bearings to be absorbed intergranularly by the hot steel journal; it is not the migration of molten bearing metal into thermal checks or cracks in the journal."

This is the first supporting data on the causes of failure of axles originally reported in Railway Locomotives and Cars, April 1953, in an article entitled, "What Causes Car Journals to Burn Off."

When copper penetration has progressed to the point that a burned-off journal results and derailment has occurred, it is too late to "turn to remove copper penetration." It is hoped that this excellent investigation will give railroad support to the further development and use of Iron Back journal bearings which contain no copper, eliminating the danger of copper penetration.

J. J. Laudig

Personal Mention

Baltimore & Ohio.—*Baltimore, Md.:* F. B. RYKOSKEY, general superintendent motive power and equipment, appointed chief mechanical officer. R. W. SENIFF, manager research, appointed manager tests and engineering. *Cincinnati, Ohio:* W. F. DADD appointed superintendent motive power, Western region.

Canadian National.—*Moncton, N.B.:* S. A. LEWIS, supervisor of motive power control, appointed assistant general superintendent of transportation, Atlantic region.

Chesapeake & Ohio.—*Richmond, Va.:* A. O. BALLINGER appointed assistant electrical engineer—fixed property, succeeding H. A. WITTEN, deceased. *Ashland, Ky.:* C. O. HUGHES, JR., appointed car lubrication inspector.

Denver & Rio Grande Western.—*Denver, Colo.:* P. W. STAUTER, assistant to supervisor of refrigeration, appointed chief mechanical inspector.

Elgin, Joliet & Eastern.—*Joliet, Ill.:* ROBERT E. BRAY, foreman, steel car shop, appointed chief car inspector, succeeding GEORGE A. HORKEY, retired.

Erie-Lackawanna. — *Salamanca, N.Y.:* WILLIAM K. PARKER appointed road foreman of engines, Allegany-Bradford divisions, succeeding ARTHUR G. CLEMENCE, retired. *Meadville, Pa.:* ROBERT C. ROSE appointed road foreman of engines, Meadville and B&SW divisions.

ICC, Bureau of Safety & Service.—*Albuquerque, N.M.:* CHARLES H. GROSSMAN, zone supervisor, retired. Mr. Grossman, under a Presidential recess appointment, was director of locomotive inspection at Washington, D.C., from September 1953 until July 1954.

Louisville & Nashville.—*South Louisville, Ky.:* HENRY U. MULLINIX appointed master me-

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chanic, succeeding J. A. PARRISH, retired. Mr. Mullinix formerly general foreman, diesel locomotive shop.

New York Central.—*New York:* ANDREW J. RITTER appointed supervisor steam generator maintenance.

Northern Alberta.—*Edmonton, Alta.:* R. D. C. COMRIE appointed master mechanic, succeeding A. WOTHERSPOON, deceased. Position of road foreman of engines abolished.

Richmond, Fredericksburg & Potomac.—*Richmond, Va.:* JAMES A. W. SMITH, general foreman locomotive department, Acca Locomotive Terminal, appointed supervisor diesel equipment. RALPH G. SELFE, assistant general foreman locomotive department, appointed general foreman diesel maintenance. RUSSELL D. STONE, foreman freight car maintenance, appointed chief car inspector.

Soo Line.—*Minneapolis, Minn.:* THOMAS F. KEARNEY appointed chief mechanical officer. Mr. Kearney formerly general mechanical superintendent of the DSS&A.

Western Maryland.—*Hagerstown, Md.:* R. R. HOLMES appointed engineer of tests. Former position of chief chemist abolished.

Supply Trade Notes

ELLCON-NATIONAL, INC. — *Emil P. Kondra,* vice-president in charge of sales, appointed also assistant to the president. *Edwin T. Richards,* Richards Railway Equipment Co., Tulsa, Okla, appointed Southwestern representative.

■

KOPPERS CO—*Fletcher L. Byrom* elected president, succeeding *Fred C. Foy* who continues as chief executive officer.

■

PULLMAN-STANDARD.—*J. W. Bergen* appointed assistant vice-president in sales department. Mr. Bergen formerly manager of western railway sales, Symington Div., Symington-Wayne Corp.

■

BUCKEYE STEEL CASTINGS CO.—*L. E. Clark* appointed sales representative, Western district. Headquarters, 80 E. Jackson Blvd., Chicago.

■

WAUGH EQUIPMENT CO.; HYDRA-CUSHION, INC.—New York office now at 230 Park ave., New York.

■

YOUNGSTOWN STEEL CAR CORP.—*James L. Kelly* named vice-president and general manager.

■

SPRAY PRODUCTS CORP.—*J. Paul Saunders Co.,* Bowling Green, Ky., appointed representative in Kentucky, Tennessee, Mississippi, and Alabama.

■

CRUCIBLE STEEL CO. of AMERICA.—*Josef H. Buerger, Jr.,* appointed director of sales. *Robert M. Simpson,* assistant general

manager—field sales, appointed assistant director of sales.

■

UNITED SHOE MACHINERY CORP.—District representatives, Pop Rivet Division: *Carlyle Abbott,* Detroit; *Thomas R. Freeman,* Kansas City, Mo., and *Ned B. Turner,* Dallas, Tex.

■

AIR REDUCTION SALES CO.—*N. F. Moody* named regional sales manager, eastern region. *F. N. Zabriskie* appointed assistant manager—sales, midwestern region. *J. P. Casalis, Jr.,* appointed district manager, St. Louis district.

■

FAIRBANKS, MORSE & CO.—FM has signed a 20-year marketing agreement with *W. H. Dorman & Co., Ltd.,* Stafford, England, to introduce Dorman L and Q high-speed diesel engines in the United States.

■

LEONARD J. SIMONS CO.—Headquarters moved from Melrose Park, Ill., to 8501 S. Kedzie ave., Chicago 52.

■

SCREW & BOLT CORP. OF AMERICA.—*Louis Berkman,* chairman of the board, elected also president, succeeding *Donn D. Greenshields,* retired.

■

WESTINGHOUSE AIR BRAKE CO., AIR BRAKE DIV.—*D. F. McConnell* appointed district engineer, with headquarters in Chicago, succeeding *D. G. Blaine,* who has been transferred to Wilmerding, Pa., as manager of new Value Analysis Unit.



John E. Angst
General American



Harry H. Chapman
Owens-Corning

GENERAL AMERICAN TRANSPORTATION CORP.—*John E. Angst* appointed general manager, freight-car division. Mr. Angst previously vice-president of ACF Industries' car division in New York.

■

DUFF-NORTON CO.—*C. Richard Schmitt* appointed sales representative in New York State, with headquarters in Syracuse, N.Y.

■

OWENS-CORNING FIBERGLAS CORP.—*Harry H. Chapman* appointed manager of transportation sales. Mr. Chapman previously supervisor of electrical insulation apparatus sales.

■

WESTINGHOUSE ELECTRIC CORP.—*George L. Wilcox,* president of Canadian Westinghouse Co., Hamilton, Ont., elected vice-president and assistant to the president at Pittsburgh, Pa.

SERVO CORP. OF AMERICA.—Agreement signed with *Wheel Checkers,* Denver, Colo., gives Servo exclusive marking rights on Wheel Checker device which automatically detects broken wheel flanges and loose wheels on passing trains.

■

WIX CORP.—*Ford-Lynch Associates* appointed sales representative, southeastern railroads.

■

BUFFALO BRAKE BEAM CO.; UNIT TRUCK CORP.—*Stephen G. Peterson* elected vice-president, succeeding *Charles R. Busch,* retired.

■

ACF INDUSTRIES, INC.—*Francis H. Boland, Jr.,* elected a vice president of ACF and appointed general manager, American Car & Foundry Division. *Charles F. Venrich,* who formerly headed division's railway sales at Chicago, appointed director of marketing for the division at New York.

OBITUARY

JOHN E. DIXON, 83, retired president of Baldwin-Lima-Hamilton, Corp., died in Pinehurst, N.C., Feb. 26.

■

ARNOLD G. PETERSON, service engineer, W. H. Miner, Inc., died Feb. 23 in Chicago.

■

JOHN T. CRALLEY, 80, retired vice-president, Standard Railway Equipment Division of Stanray Corp., died Feb. 25 at Santa Barbara, Calif.

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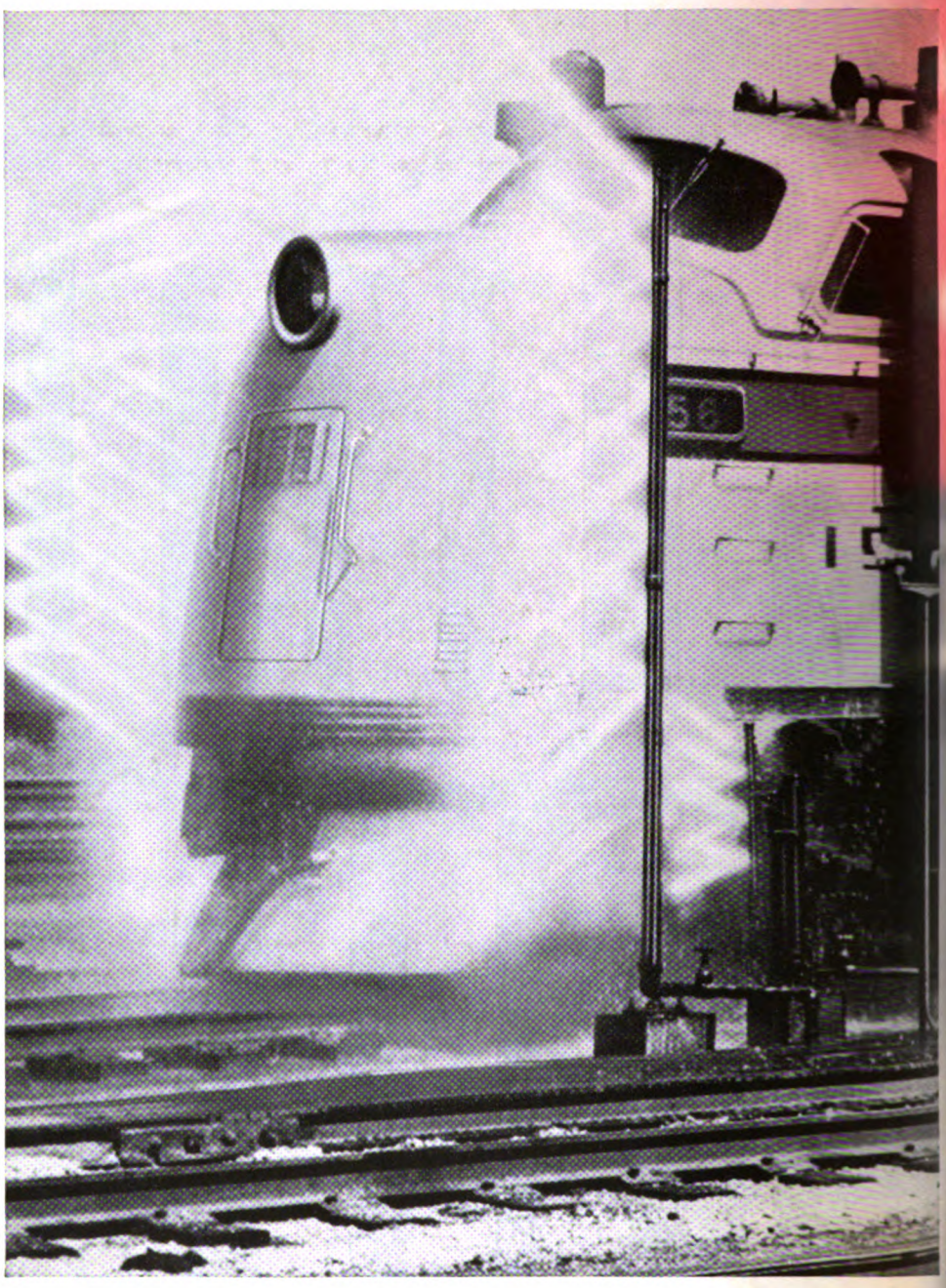
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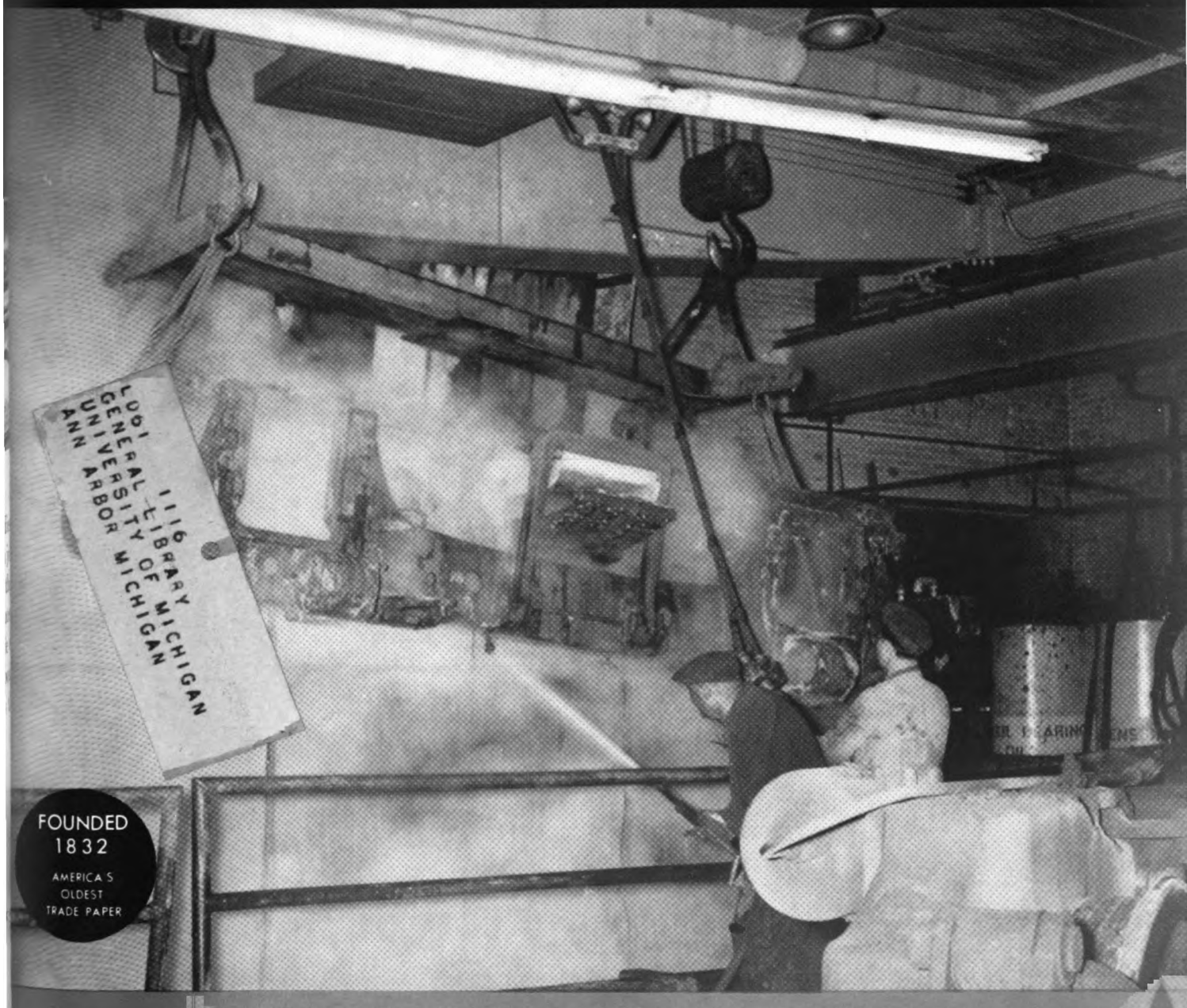
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Milwaukee Truck Repair Shop ... page 17



Performance Report of General Electric's New U25B on the Great Northern

5459 TONS–164 MILES–AVG. 41 MPH

SERVICE HISTORY—As part of a demonstration program on major U.S. railroads, two General Electric U25B locomotives, like those above, recently completed 5588 miles on the Great Northern Railway, hauling a total of 312,498,000 gross ton-miles between Union Yard in the Twin Cities and Whitefish, Montana.

SCHEDULE PERFORMANCE—Fewer units powered the Great Northern's high-speed main-line freight service and still maintained established schedules with the U25B locomotive's 2500 hp on four axles. A typical run showed these results:

New Rockford, N. D.—Breckenridge, Minn., 164 miles, 0.3% ruling grade
Two U25B's—80 loads, 10 empties, 5188 trailing tons, 5459 gross tons, 164 miles

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Balance Speed	—34.5 mph on + 0.3%
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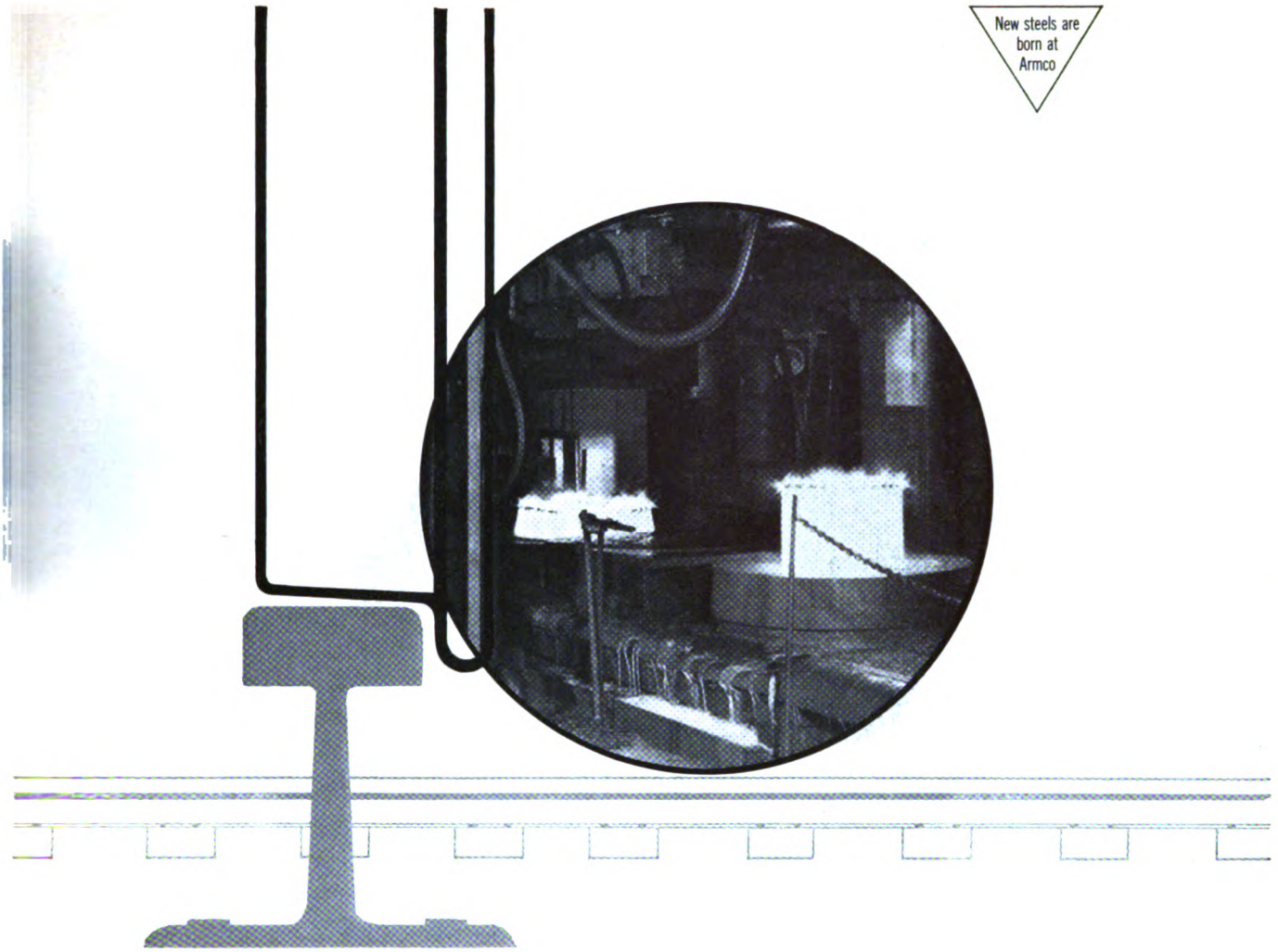
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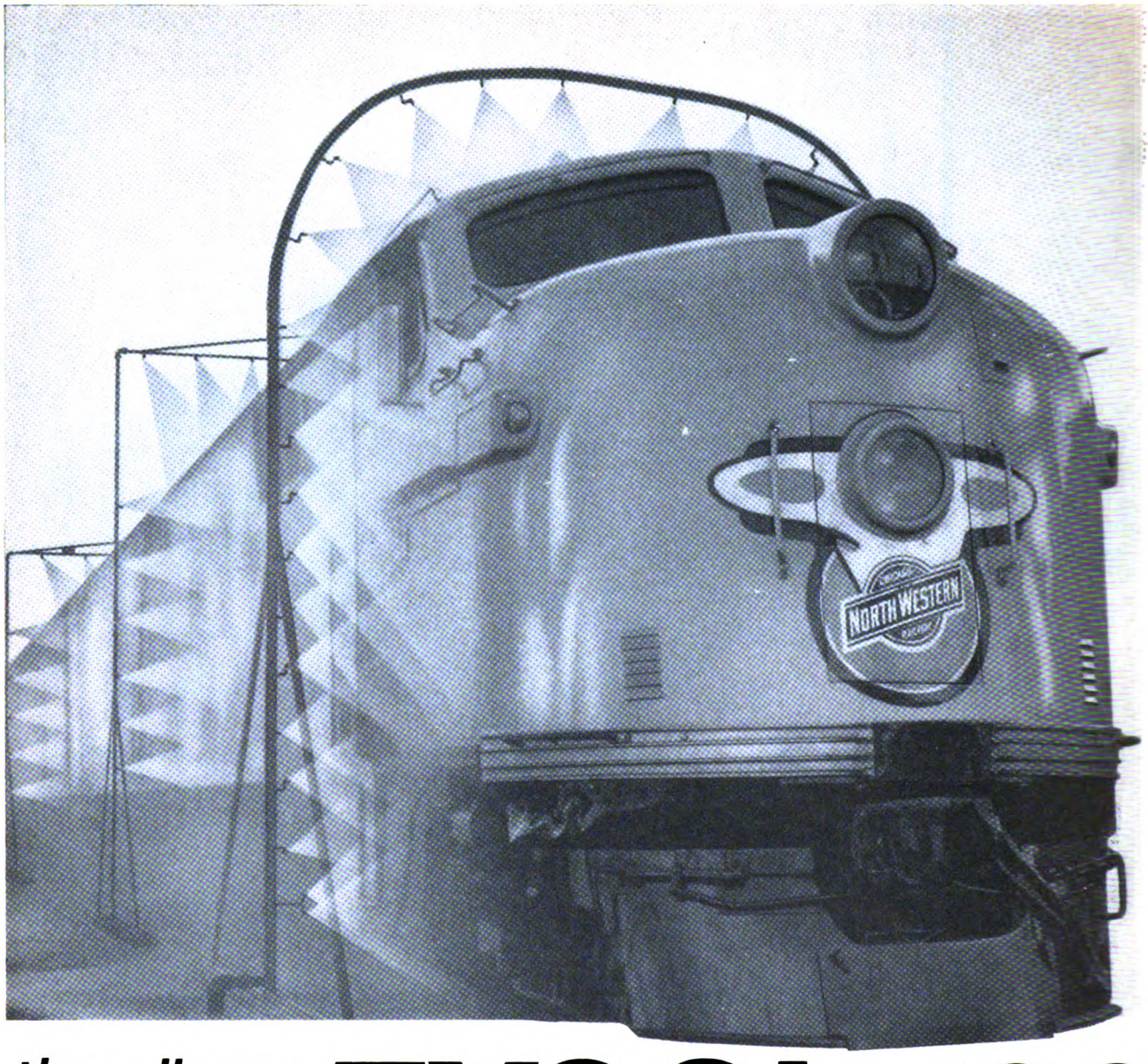
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May, 1961—Vol. 135, No. 5

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REPORT FOR MAY

New Electrical Committee

Electrical Section work pertaining to locomotives and rolling stock which, until the end of 1960, was handled by the AAR Electrical Section of the Engineering and Mechanical Divisions is now being taken over by a Mechanical Division Committee on Electrical Equipment—Rolling Stock. The members of the new committee are J. W. Horine (chairman), electrical engineer, Pennsylvania System; J. V. Dobbs (vice-chairman), car lighting and air-conditioning engineer, Santa Fe; R. I. Fort, electrical engineer-equipment, Illinois Central; C. F. Harvey, diesel engineer, Southern; H. J. Betts, chief electrical engineer, Canadian National; D. F. Dunsmore, electrical engineer-system, Chesapeake & Ohio; R. H. Russell, electrical engineer, Great Northern; T. G. Isel, engineer of car equipment and standards, Pullman Co.

Land Transportation Committee Automation Conference

The Railroad Computer and Automation Conference of the AIEE Land Transportation Committee, now scheduled for June 6-7, will be held at the Cleveland Engineering Society Building, Cleveland, Ohio. The program for the technical sessions on Tuesday, June 6 is as follows:

New York City Transit Authority Automated Trains—R. G. Welch, division engineer, NYCTA.

Opportunities for Computers in Land Transportation—R. S. Gillette.

Experience of the French National Railroads in the Field of Remote Controlled Train Operations—J. C. Blumstein, French National Railroads.

Automation of Mail Handling in Railroad Terminals—G. H. Hines and E. H. Abbe, General Electric Co.

Recent Developments in the Operation of Unmanned Locomotives and Trains—L. R. Allison, Union Switch & Signal Co.

Heuristic Train Dispatching—by J. L. Gable.

On Thursday, June 7, inspection trips will be made to the Chesapeake & Ohio Computer Center and the Cleveland Rapid Transit System.

65% of Freight Cars Have Lubricators

Journal lubricators were installed on 65.3% of all freight cars on January 1, 1961. This was up 9.1% over June 30, 1960, figures and included 1,206,096, or 65.4%, of the railroad owned cars and 176,825, or 64.9% of the privately owned cars.

AAR hot-box figures show 6,181 cars set off between terminals in January 1961, giving 378,508 miles per hot box. Pad-equipped cars, now about two-thirds of total ownership, had only 37.2% of reported hot boxes.

In January 1960, hot-box mileage was 324,954 and pad-equipped cars, then just under half of the total ownership, had 28.2% of the hot boxes.

ICC Rejects HD Tank Design

The new HD tank car of the Union Tank Car Co. (RL&C, June 1960, p 40) has failed again to get ICC clearance. Reporting on further hearing in No. 32258 (RL&C, Nov. 1960, p 8), the Commission's Division 3 has denied Union's petition for approval of the new design which embodies several innovations, including the elimination of running boards.

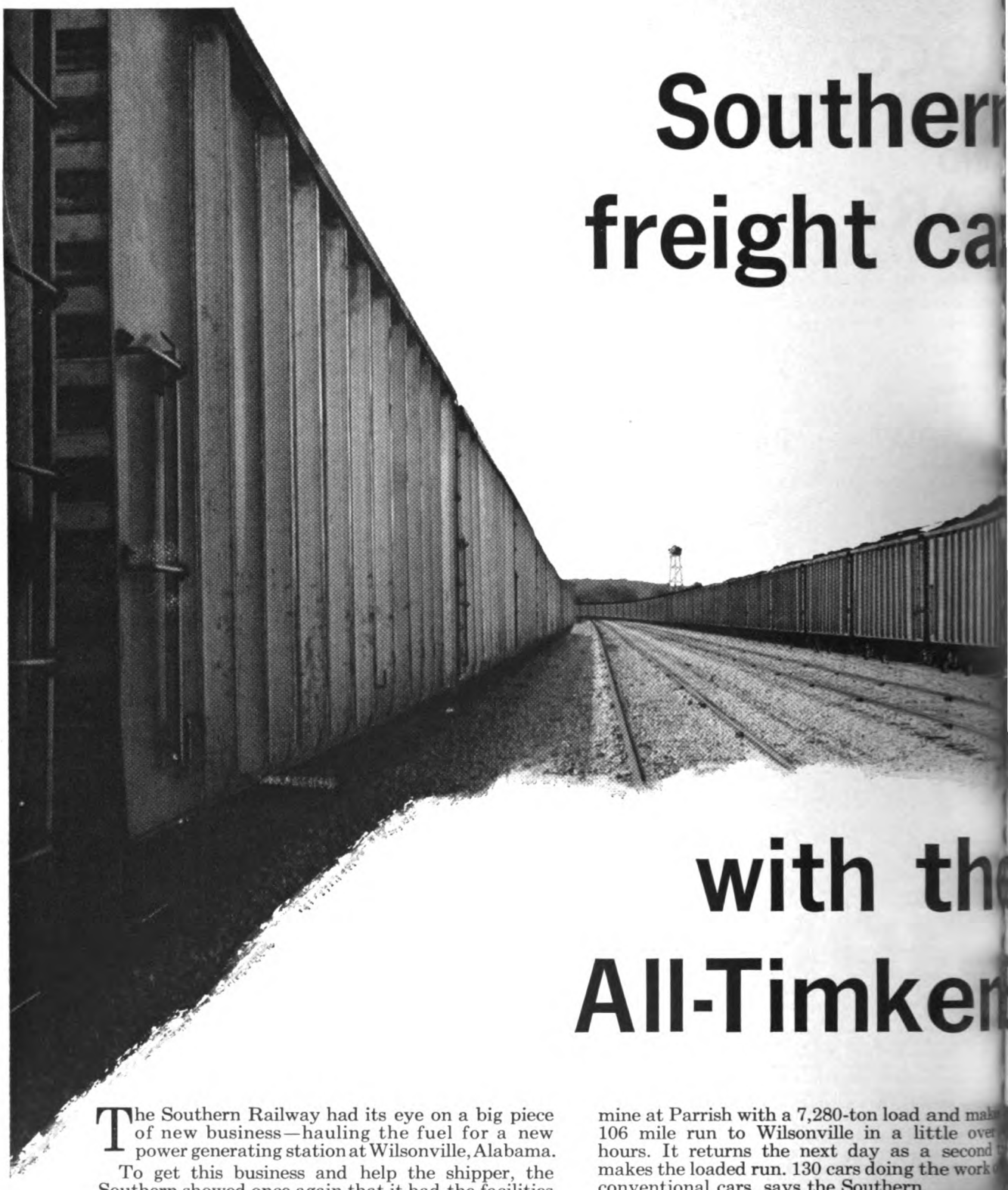
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TIME SAVING IDEAS FOR MAY

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Southern freight ca

with th All-Timken

The Southern Railway had its eye on a big piece of new business—hauling the fuel for a new power generating station at Wilsonville, Alabama.

To get this business and help the shipper, the Southern showed once again that it had the facilities and the imagination to do the job. It started with a new kind of car—giant gondolas with aluminum for everything above the center sill. The result was that by converting tare weight to revenue capacity, the Southern was able to haul 111 tons per car!

These new cars cost $21,000 apiece—not an investment to keep around the repair track. And to help make sure they stay in service, the Southern specified Timken® "AP" tapered roller bearings for the axles—making it an all-Timken bearing train. It cost the railroad less than 5% extra—and helped them get new business and make a profit on it. Each car brings in about $18,000 revenue annually.

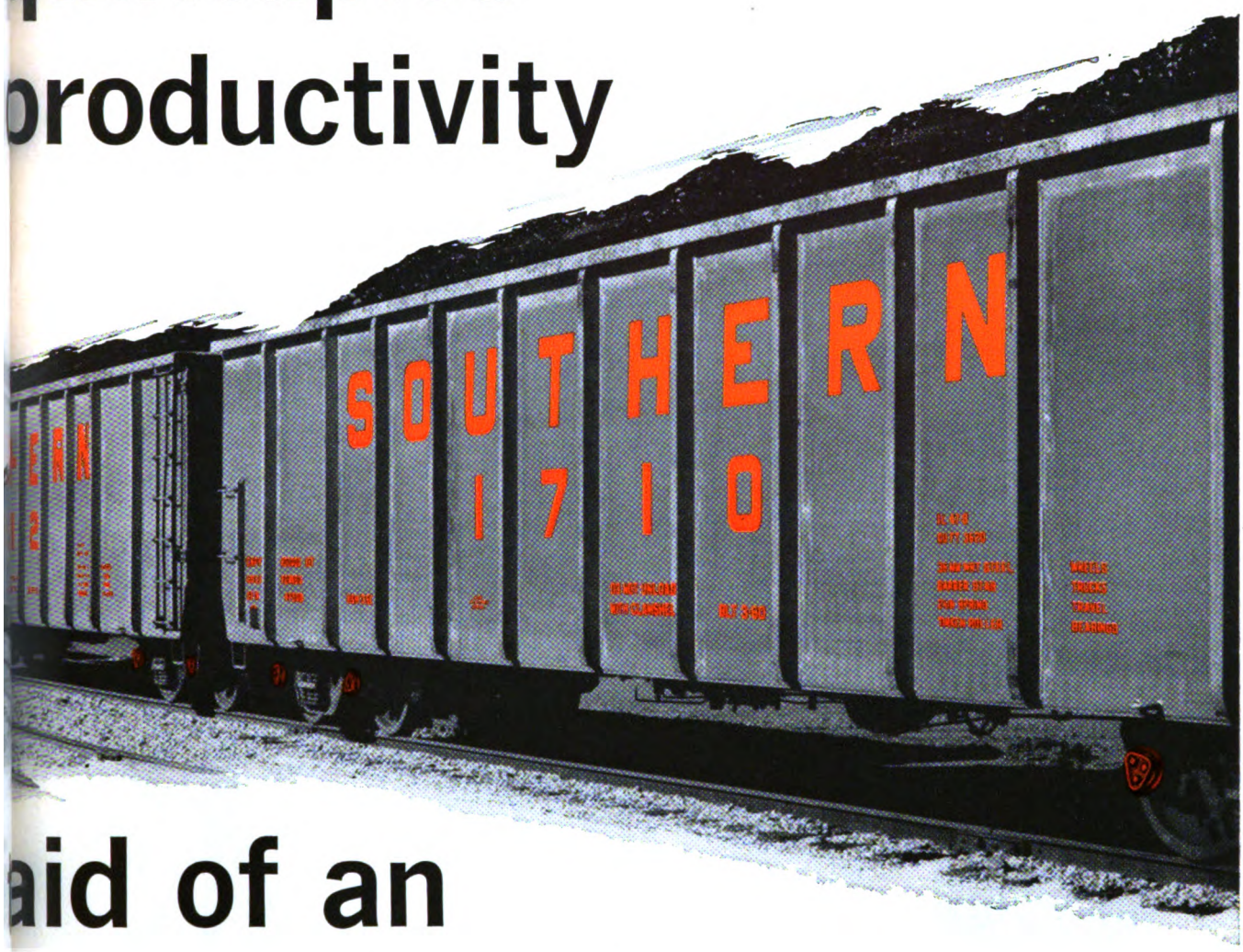
Now, every working day, a 65-car train leaves the mine at Parrish with a 7,280-ton load and mak 106 mile run to Wilsonville in a little over hours. It returns the next day as a second makes the loaded run. 130 cars doing the work conventional cars, says the Southern.

More and more railroads are turning to Ti heavy-duty bearings to deliver better servi shippers and to cut maintenance and operating

Timken bearings average more than a hu million car-miles between setouts caused by heated bearings. They cut terminal time be they require only visual inspection, will roll years without additional lubricant.

To date 99 railroads and private car owners over 73,000 cars on Timken "AP" tapered bearings in service or on order. Now's the ti make the switch to lower costs and bigger pro The Timken Roller Bearing Company, Canto Ohio. Cable address: "TIMROSCO".

quintuples productivity



aid of an Bearing train



THE MINE, at Parrish, Alabama, a 65-car South- train is loaded each day. Intensive utilization hese high cost cars makes the system practical. d Timken bearings help keep the cars in service.



106 MILES AWAY, at Wilsonville, rotary dumpers empty cars in 90 seconds. In about three hours the train is ready for its return trip. This assured availability helps make one-way service profitable.



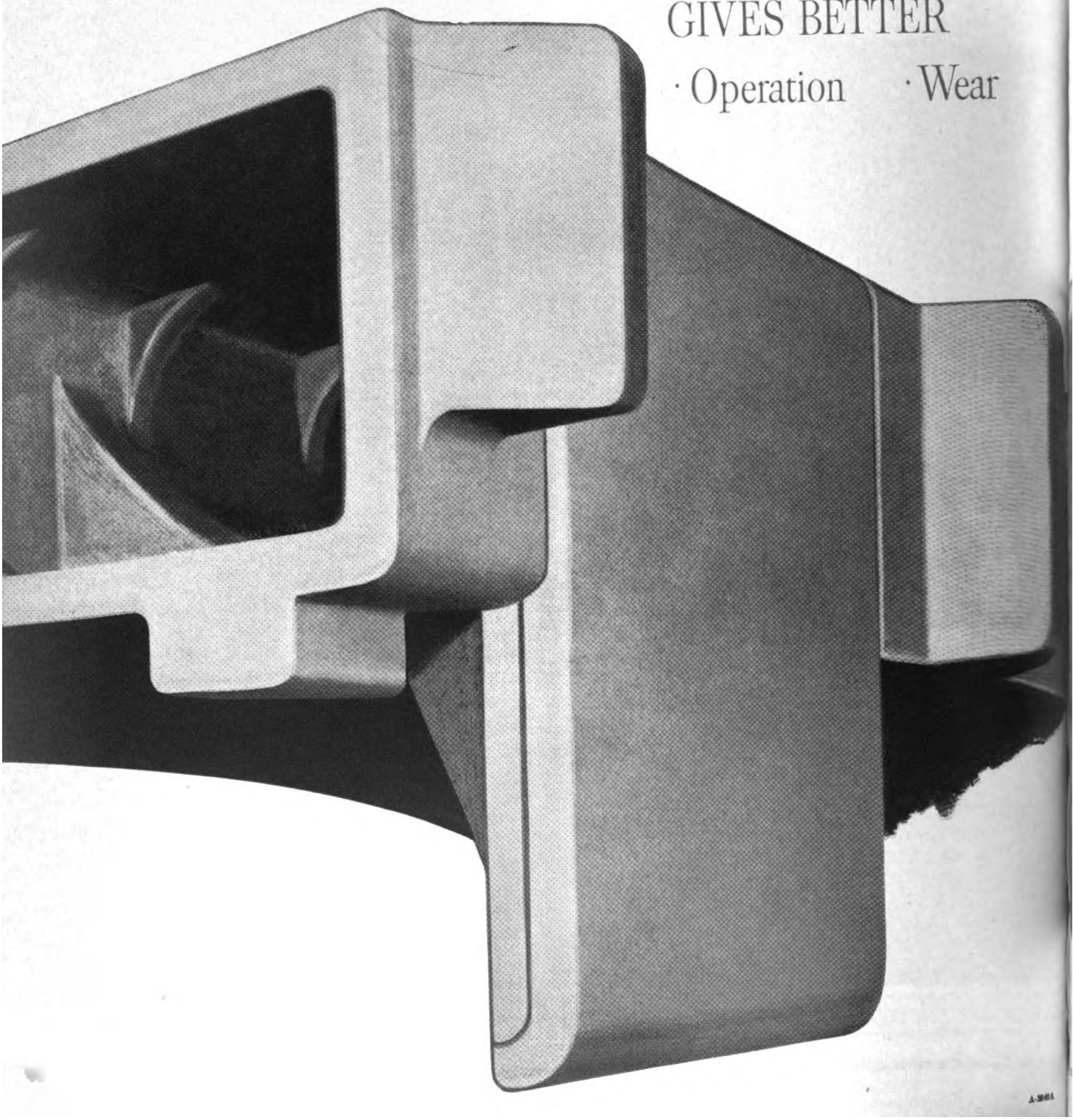
RIGHT--right from the start

BALANCED

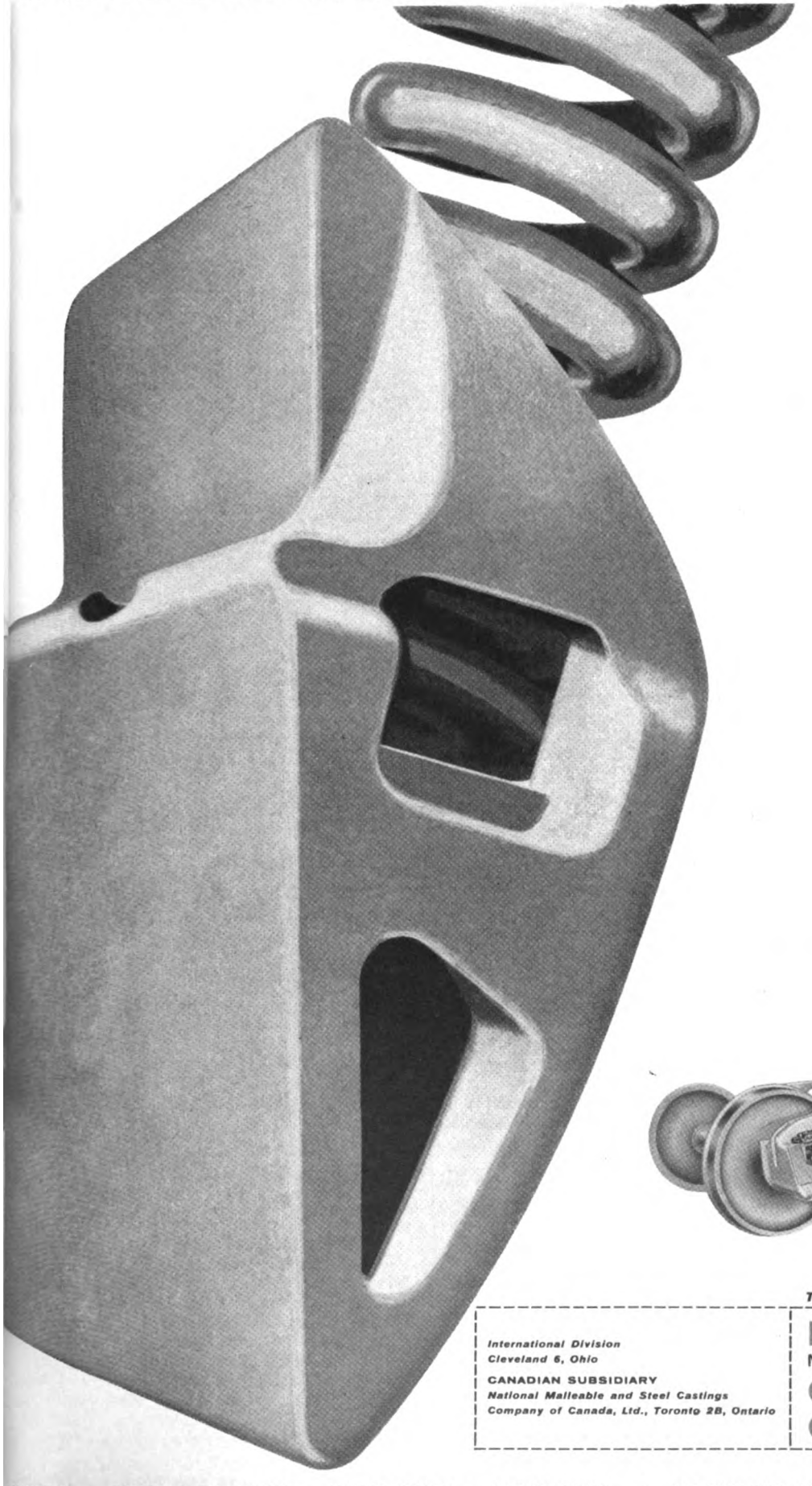
· Design · Metallurgy

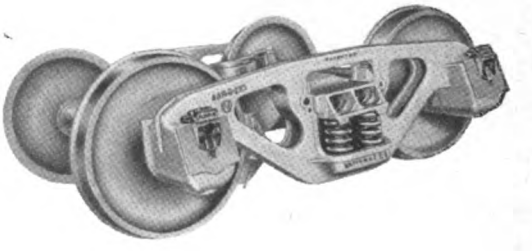
GIVES BETTER

· Operation · Wear



NATIONAL C-1 TRUCKS





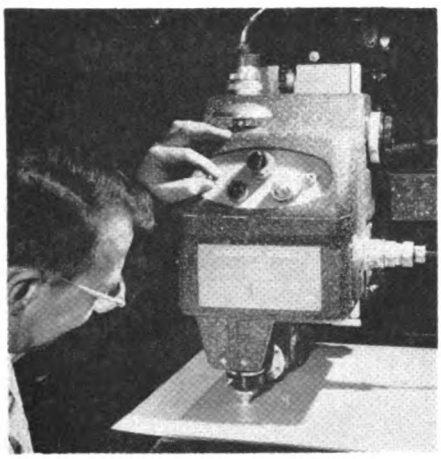
Transportation Products Division

International Division
Cleveland 6, Ohio

CANADIAN SUBSIDIARY
National Malleable and Steel Castings Company of Canada, Ltd., Toronto 2B, Ontario

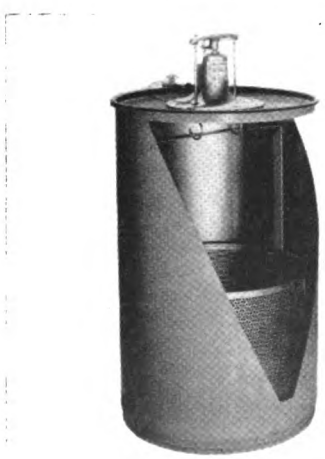
NATIONAL
MALLEABLE AND STEEL
CASTINGS COMPANY
Cleveland 6, Ohio

COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • JOURNAL BOXES • NATIONAL SPEEDLOADER CONTAINER HANDLING SYSTEM



Electronic Tracer

The Aircotron Model J electronic tracer uses templates prepared by conventional drafting methods for cutting work of a non-repetitive type. It has a cutting range speed from 5 to 24 in. and uses 115-volt, 50-cycle, single-phase current at 5 amp. By substituting an appropriate drive motor, higher or lower speeds can be obtained. Stepless cutting speed control and tracing of 90-deg corners without the need of corner radii are provided. The unit can also be used for chain cutting. *Air Reduction Sales Co., a division of Air Reduction Co., Dept. RLC, 150 East 42nd st., New York 17.*

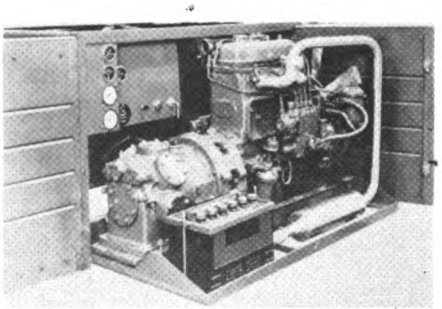


Portable Cleaning Unit

The Mini Dip unit has a parts cleaning capacity of 45 lb. It consists of a 20-gal open-head drum packed with 15 gal of decarbonizing, desludging, devarnishing compound; a basket that fits inside the drum, and the compressed-air-operated, automatically agitated Mini Dip unit that fits over the top of the drum. It is recommended for small shops and for decentralized cleaning in larger ones. *Magnus Chemical Co., Dept. M-124-3, Garwood, N.J.*

Nailable Steel Floor

The Tri-Rib nailable steel floor with 3-in. reinforced rib spacing was developed to provide maximum floor support for fork lift concentrated wheel loads. It can be welded in place from within the car and features more nailing grooves, lapped alternate reinforcing ribs and new rib filler material. Standard 2-ft panels weigh 260 lb. *Transportation Specialties Co., 80 East Jackson Blvd., Chicago 4.*



Refrigeration-Heating System

The Worthington TDU-800 refrigeration system is applicable for use on highway and piggyback trailers. When installed, it is said to weigh 300 lb less than other competitive systems of equivalent capacity. It takes up 50% less loading space. It consists of a diesel-engine-driven condenser unit and evaporator unit designed to maintain temperatures from minus 10 to 75 deg. F. The condensing unit weighs 1,050 lb and includes a 4-cyl Mercedes-Benz engine and a 5-cyl, 7½-ton aluminum compressor mounted in a tray on slides under the trailer for easy removal when maintenance is needed. The vertical air-flow evaporator unit requires 13 in. loading space and weighs 350 lb. It is designed for floor mounting and is protected from the lading by a full bulkhead. Two fans with separate 12-volt d-c motors operate at constant speed to provide uniform air circulation. The temperature control unit is mounted on the front of the trailer. Automatic defrost controls are provided. *Worthington Corp., Dept. RLC, Harrison, N.J.*

Tank-Car Paint

Urethane paint—a mixture of modifying resin, pigment, solvent, and urethane prepolymer—applied to tank cars of the Allied Chemical Co., is said to have confirmed the resistance of urethane coatings to corrosive chemicals, abrasion, and weathering. About 16 gal were needed to coat each tank car. Thickness averaged 5 to 6 mils, and maximum coverage was 750 sq ft per gal per mil. It was applied with a spray gun, using 10 to 15 psi fluid pressure based on a 50-ft length of ½-in. inside diameter hose. *Spencer Kellogg & Sons, Dept. RLC, P.O. Box 989, Buffalo 5, N.Y.*



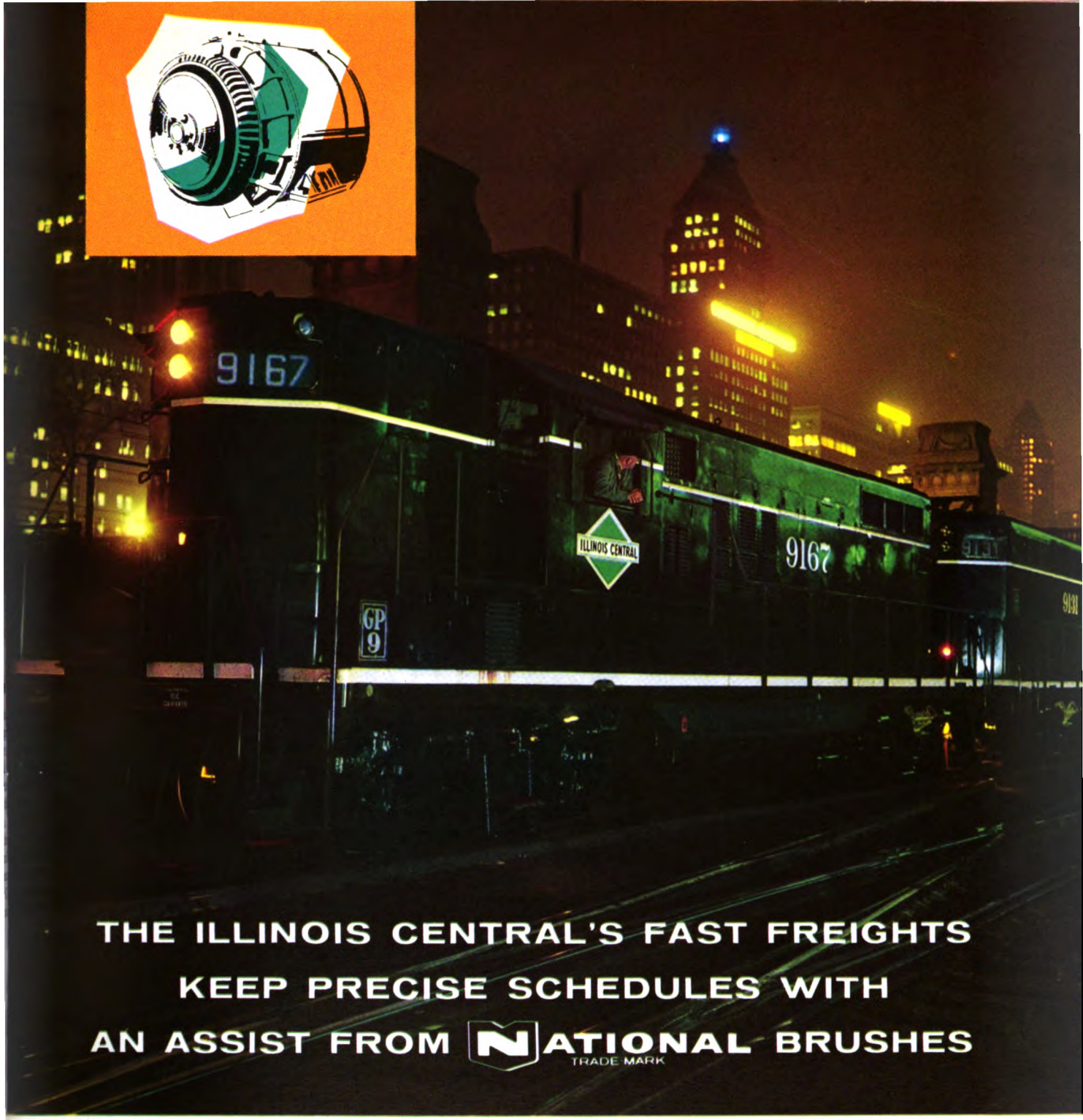
Dipping Basket Container

Jaldip consists of an all-steel container and dip strainer basket for cleaning or applying protective coatings to tools, machine parts, etc. It is available in 1½- and 6-gal sizes, 8⅜ and 11¼ in. in diameter, respectively. The removable container head is either a lug cover or a lever ring closure. The strainer basket has hooks for attaching it to the container during drainage and legs to keep it clear of sediment on the container bottom. *Jones & Laughlin Steel Corp., Dept. RLC, 3 Gateway Center, Pittsburgh 30, Pa.*



Two-Way Lock Nut

Double chamfer allows the reusable Two-Way lock nut to be applied automatically from either side, and eliminates need for selective devices. The locking device is in the body of the nut which is ovalized to give 180 deg spring. The threads are deflected at point of lock so that the nut can be locked in any position. The nut can be had in sizes No. 5 through 1¼ in.—American Standard finished dimensions. *MacLean-Fogg Lock Nut Co., Dept. RLC, 5535 N. Wolcott ave., Chicago 40.*



THE ILLINOIS CENTRAL'S FAST FREIGHTS KEEP PRECISE SCHEDULES WITH AN ASSIST FROM NATIONAL BRUSHES

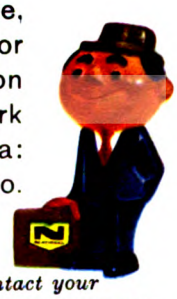
TRADE-MARK

Modern railroads like the Illinois Central are using fast freights to bring improved service to their customers. Programs of this nature require trouble-free motive power with minimum lost-time for maintenance.

All the components in the locomotive, no matter how large or small, must offer rugged, dependable service to assure that these complex schedules will be met.

"National" generator brushes—small but vital components—offer proved commutation and life, and operate with the reliability so necessary for today's progressive railroad service.

National Carbon Company offers a positive carbon brush service program to help America's railroads provide improved freight delivery. To realize this assistance, just call your "National" Brush Man, or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. In Canada: Union Carbide Canada Limited, Toronto.



Contact your "National" Brush Man

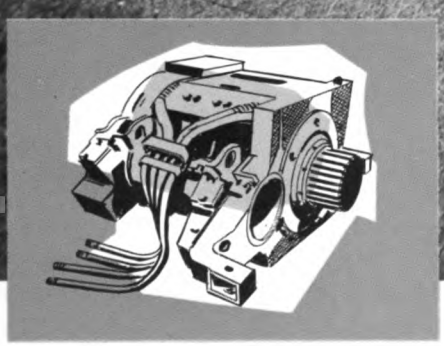
UNION CARBIDE

"National" and "Union Carbide" are registered trade-marks for products of

NATIONAL CARBON COMPANY

THE SOUTHERN PACIFIC'S FAST FREIGHTS MEET EXACTING SCHEDULES WITH AN ASSIST FROM NATIONAL BRUSHES

TRADE-MARK



Because of the Southern Pacific's fast-freight service, industrial customers served by this 14,900-mile rail network are permitted to maintain smooth production schedules with a minimum of inventory.

The close scheduling involved requires rugged and reliable service from fast freight diesel locomotives.

"National" traction motor brushes—wherever used on the Southern Pacific's 2,000 diesels—offer dependable commutation and life . . . and help keep motive power in service by reducing maintenance.

To meet today's constantly changing and more difficult electrical conditions, National Carbon Company contributes to improved railroading through a positive carbon brush service program. To realize this assistance, just call your "National" Brush Man or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. In Canada: Union Carbide Canada Limited, Toronto.



Contact your "National" Brush Man

UNION CARBIDE

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EDITORIALS

Let George Do It

"Why don't the railroads carry on research like other industries?" is a question frequently asked. It is then usually implied that the railroad's failure to do more research is a major cause for their current competitive condition and financial state. While the answer to the first part of this question is that they do conduct individual and cooperative research, the "like other industries" portion could, when examined closely, be found to be but one more symptom of what is really wrong with railroading.

Look at the commercial aviation industry. Over the past three years the world's airlines have put into service radical new equipment which has completely changed the tempo and scope of their operations. Research has certainly played a big role in the jet revolution. Who did that job? What are the airlines now doing about future technology? Not too much apparently, but there's no reason for them to be concerned.

"Shortly after 1970," one newspaper recently reported, "you will probably be able to fly from New York to Los Angeles in 1 hr 16 min . . . The prospect was held out by Najeeb Halaby, Federal Aviation Agency Administrator, who told engineers and industrialists the government was willing—in fact, eager—to invest $12,000,000 to determine the feasibility of a supersonic jet air liner capable of such a schedule.

"Should Congress grant the funds, a committee headed by Mr. Halaby and representing the National Aeronautics and Space Administration and the Defense Department, as well as the FAA, would make the study. Following its feasibility study, the government would bring together aircraft manufacturers, airline operators, the military, and civilian government agencies to develop the plane. It would, Mr. Halaby said, be the largest single project ever undertaken in the aviation industry. 'President Kennedy has asked me to spearhead the government's initiative in this area,' Mr. Halaby stated."

Mr. Halaby then explained that the supersonic airliners probably will have to be flown for a year or more in cargo operation before they could be considered safe enough for passengers. "The Boeing 707 subsonic airliner has been able to jump right into passenger operations only because thousands of hours of experience had been built up with the military version. Most other commercial jets now flying also were able to skip any interim cargo operations, having also benefitted from the experience of the military 707."

"Like other industries" when applied to commerical aviation seems to mean letting the government be the "George" who does the job. It means letting the government write off the $12,000,000 feasibility study if the project should prove to be unfeasible. With enthusiastic government backing and taxpayer's money, there would seem to be little possibility of such failure. Instead, it would appear that commercial aviation will probably get, already neatly packaged, the tools for its next "great leap forward."

Advancements in technology don't come so easily and cheaply in railroading. Railroads don't get taxpayers to foot their research bill.

Feast-or-Famine Buying

We are not very smart. Otherwise, the railroads and the car builders would have solved long ago the "feast-or-famine" cycle of freight-car buying.

For some time we have been in the "famine" phase of the cycle. The backlog of cars on order on April 1, 1961, was 15,801 compared with 42,131 cars on April 1, 1960. Only 4,278 of the 15,801 cars on order were backlog orders of the car builders; the remaining 11,523 cars were on order from the railroads' own shops.

The "feast-or-famine" cycle costs the railroads money because plant idleness incurs costs that must be included in the price of cars. And when the "feast" phase starts, the railroads then want the cars on a hurry-up basis which always involves added costs.

Smoothing out these violent fluctuations in car orders is a worthwhile project. We do not have the answer to the problem but perhaps special inducements could be offered when signs point to a deterioration in car orders. Why should we wait until a situation becomes critical, like the commuter problem, before taking corrective action?

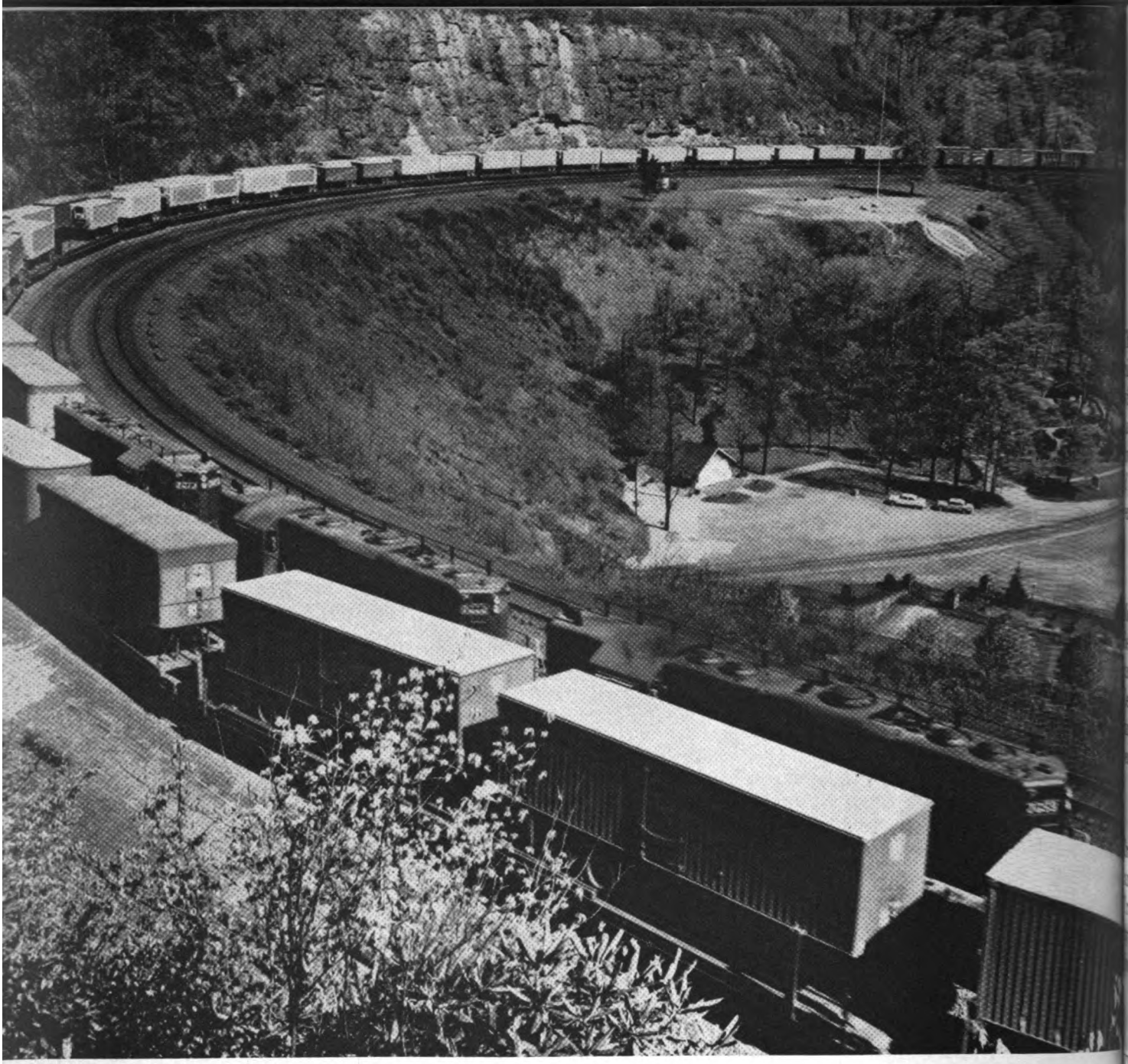
Mechanical Meetings

The industry is aware that the AAR Mechanical Division has cancelled its regular June, 1961 annual meeting as part of AAR economy measures. Mechanical Division committee reports will be presented before a limited, closed session of the Division's General Committee to which committee chairmen and a relatively few mechanical department officers are to be invited.

So that all those interested can know what actions are taken, Railway Locomotives and Cars will give greater coverage than usual in its July issue to a report of the important and essential work of the Mechanical Division.

In September the Coordinated Associations will hold their regular meetings along with what promise to be exceptionally fine track and hotel exhibits of the Allied Railway Supply Association. The Air Brake, Car Department Officers, Locomotive Maintenance Officers, and the Railway Fuel and Operating Officers Associations have already set up outstanding programs for these September 10-13 meetings.

We regret the loss of personal contact between the Mechanical Division's membership but we believe our efforts will help to fill the void caused by the cancellation of the regular AAR meeting. We also believe that the September meetings will be a wonderful opportunity for all mechanical department officers to get together and exchange worthwhile ideas and information.





SIGNS OF THE TIMES ON HORSESHOE CURVE . . . two trains of strictly modern vintage sweep westward 'round the Pennsylvania's storied bend above Altoona. More than half of all piggyback flat cars bear the now-familiar double "T" of Trailer Train.

QUALITY CONTROL ON A TTX CAR . . . weld inspection is just one of many phases of quality-control in Bethlehem's freight-carbuilding program. Weld-prober has just cut small weld specimen (foreground) from buttweld in center sill cover plate, with which inspector can check weld quality.

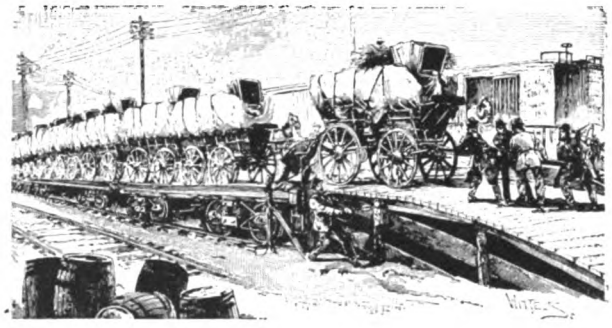
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

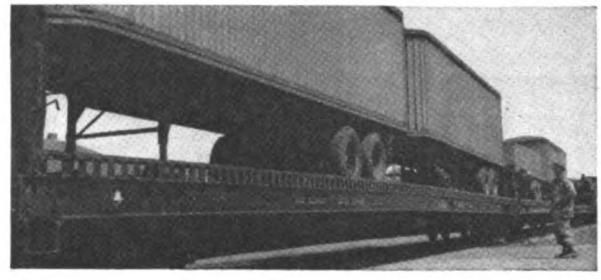
Trailer Train's 5 years have been big years of piggyback progress

IN 1884



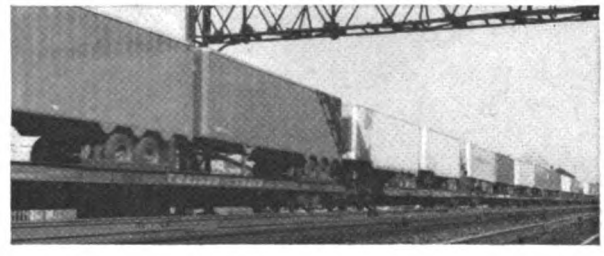
The piggyback freight idea goes well back into railroad history. In 1884, an eastern railroad wheeled farmers' produce-laden wagons onto flat cars for shipment into the city. Then, as now, the wagons were end-loaded onto strings of cars by means of ramps which were crude versions of those in use today.

IN 1954



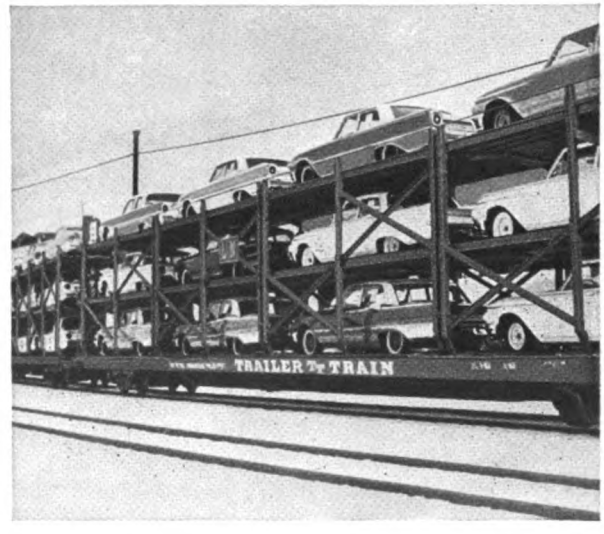
Modern piggybacking started to roll when Bethlehem built the first of the king-size flat cars: 200 for the Pennsylvania, 50 for the Erie. Designed to haul two 35-ft trailers each, these cars are 75 ft long, equipped with roller-bearing axles.

IN 1956



Trailer Train (TTX) was born. Trailer-on-flat-car service was catching on fast, and Trailer Train swiftly moved with the tide. In five dynamic years, TTX grew to its present position of outstanding leadership.

TODAY



TTX continues to expand its fleet. Just recently it took delivery of the final shipment of an order for 125 Bethlehem-built 85-ft cars equipped as shown to accommodate the fast-growing transport of new autos by rail. Long strings of cars like these, traveling on passenger train schedules, are playing an important part in bringing this traffic back to the railroads. One expert predicts that in five years or so piggyback freight will rush from coast to coast in 48 hours.

Bethlehem congratulates Trailer Train on its momentous fifth birthday, and looks ahead to many more such anniversaries to come.

BETHLEHEM STEEL

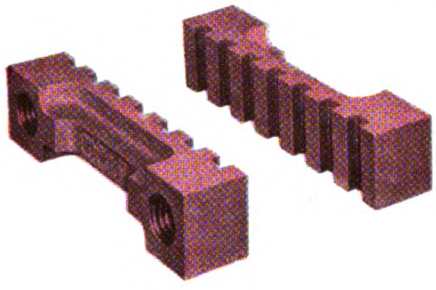
for Strength
. . . Economy
. . . Versatility

Steel

STABILIZED JOURNALS—

Now MAGNUS offers you three low-cost ways to get

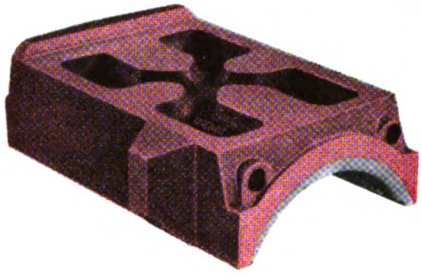
BETTER BEARING PERFORMANCE



1. MAGNUS R-S JOURNAL STOPS

Provide maximum stabilization of entire journal box assembly—increases miles per hot box ten times

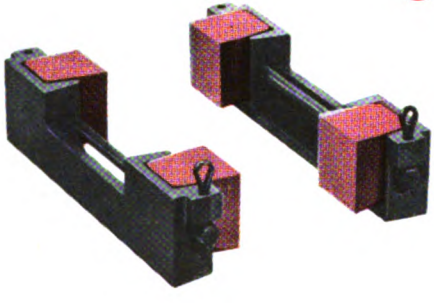
Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures—increase miles per hot box *ten times;* miles per cut journal, *fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.



2. MAGNUS FLAT-BACK SOLID BEARINGS

Wider, non-tilting design limits bearing displacement—provides effective stabilization at lower cost

The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust-guard, reduces loss of oil through enlarged dust-guard openings and tends to prevent spread linings in the bearing.



3. MAGSTOPS

Offer the inherent advantages of R-S Journal Stops in a low-cost, rugged, fabricated design

Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The next big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

MAGNUS METAL CORPORATION

Subsidiary of

NATIONAL LEAD COMPANY

Milwaukee Improves Truck Repair

Shop has been arranged and tooled to produce overhauled trucks for all road's locomotives

Improvements recently completed by the Milwaukee have produced a diesel locomotive truck repair system at the Milwaukee, Wis., shop which is designed for an output of four trucks rebuilt or given running repairs each day. Traction motor repairs are also geared to this output (RL&C, Jan. 1960, p 41).

The Milwaukee shops its General Motors diesel road locomotives on a mileage basis for resealing. For passenger units this is done every two years (480,000 miles) and for freight units every three years (360,000 miles), based on an average of 20,000 and 10,000 miles per unit per month, respectively. Trucks are shopped after 240,000 miles and traction motors at 300,000 miles.

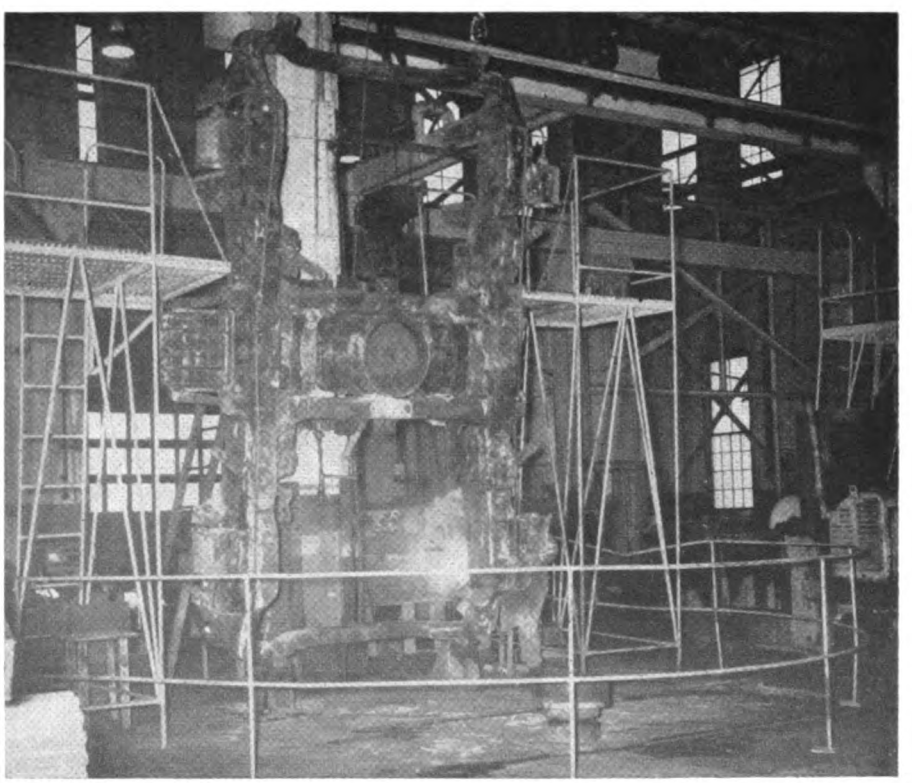
New equipment and advanced repair techniques are expected to improve the quality of truck repairs. By restoring trucks to new truck specifications, the road expects increased life for roller bearings and wheels.

The shop has a 17-man work force and 19 work stations. Electric-hoist jib cranes are located to serve pairs of work stations, with the exception of the running repair stations. Tool and parts racks adjacent to rebuild stations are completely equipped for assembly operations. An overhead 20-ton crane, running the length of the shop, simplifies handling of traction motors, wheels, truck frames, and complete trucks. Running repair trucks are generally placed wheels-down on working height elevated track stations for removal of traction motors and minor repairs. Trucks are inverted at the stations involved in heavy rebuilding.

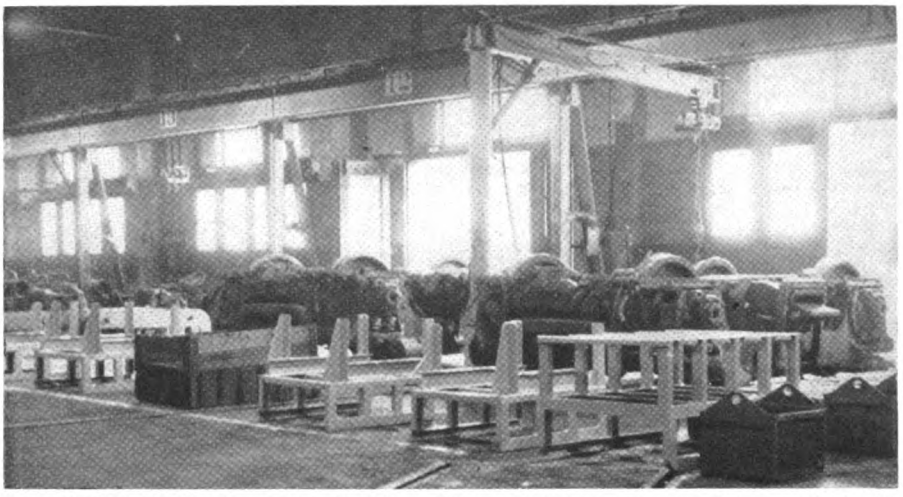
Diesel units requiring truck changes come into the adjacent engine-house to a drop pit. Trucks for repair then move directly into the truck shop on a track leading from the drop pit. Inspection is made by the truck foreman to determine necessary repairs. Trucks requiring running repairs are placed at three special stations. Those scheduled for rebuild are placed upside down on individual dollies and spotted at any of the four stripping stations. Wheels, traction motors, journal boxes, and brake pistons are then removed in preparation for truck cleaning. Four trucks can be stripped by two men in one day.

Each truck frame is placed in the cleaning vat for 4 hr. In the bottom of the vat are three suction pipes of different lengths. Each pipe ends in a rectangular strainer. The cleaning solution is agitated by compressed air from perforated pipes on each side of the bottom of the vat. For more effective cleaning and extended cleaning solution life, a Henry self-cleaning liquid filtering machine is installed on the vat. Pumps connected to each suction pipe move contaminated cleaning solution to the inlet side of the filtering machine where a series of diffusers slow the liquid so floating dirt, oil, and grease rise to the surface in the skimming compartment.

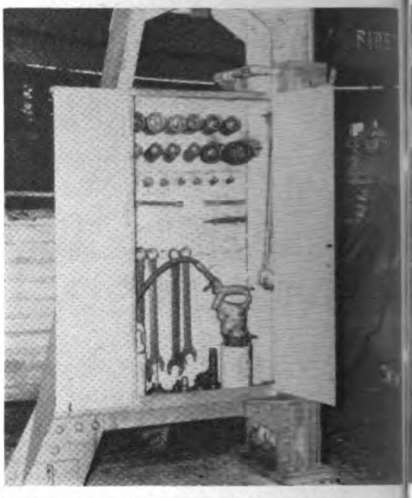
The solution then flows over overflow weirs into the settling compart-



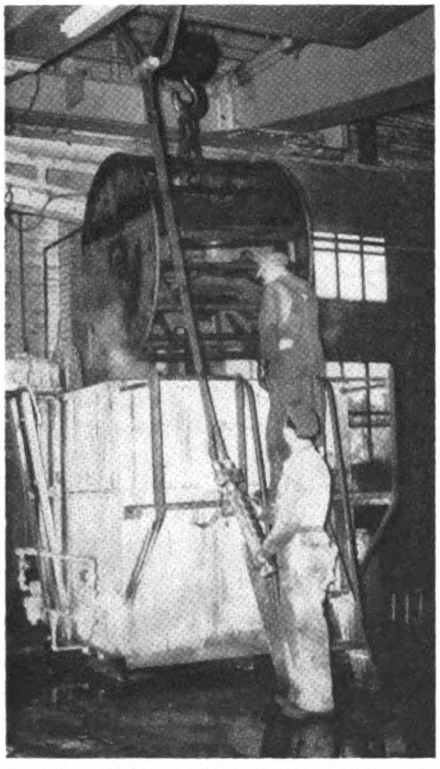
Down-hand welding of pedestal jaws can be done on two levels at the tip-up stations. Pivoting device to reposition the truck frame fits in center casting.



Separate skids at stripping stations hold the wheel and traction-motor assemblies and the brake pistons. Truck frames go to the cleaning vat following disassembly.



Tool cupboard has complete set of hand and power tools for the truck-stripping operations.



Container holding eight traction-motor gear cases is removed from the special cleaning tank.

ment where particles down to 50 micron size settle out. Conveyors below the skimmer and overflow weirs continuously carry settlings out of the unit. The solution then flows through the overflow troughs into the clean solution compartment and back to the cleaning vat by gravity. The truck cleaning vat is expected to require cleaning only annually. In the past, it was necessary to shut the vat down a day every three months while a clamshell removed two to three tons of sediment accumulation.

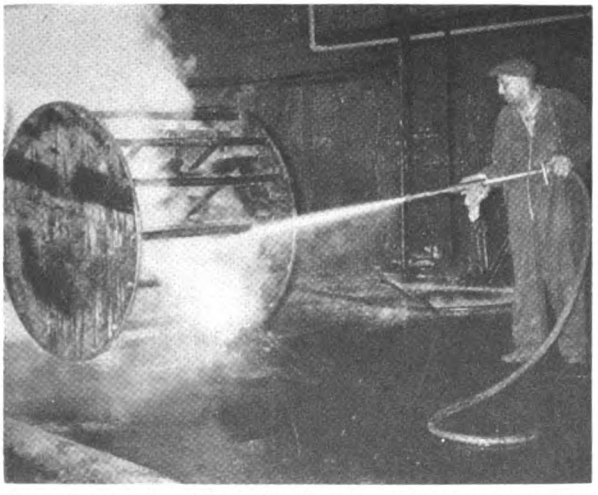
Typical Cycle

A typical cleaning cycle on four-wheel EMD trucks starts on Monday morning at 10 a.m. when the first truck frame is placed in the vat for the 4-hr cleaning cycle. By the next morning, the four cleaned frames will have been placed upside down at the four rebuild stations.

Completion of stripping of the cleaned truck frames involves removal of the pedestal liners and coil springs the first day, and the brake rigging on the second. Truck sets of brake rigging are placed in skids and moved to the repair area where parts are built up by welding and where new bushings are applied.

An eight-compartment cylindrical container is used for the cleaning of truck sets of traction-motor gear cases. The elevated cleaning tank is provided with rollers to rotate the container through the hot cleaning solution.

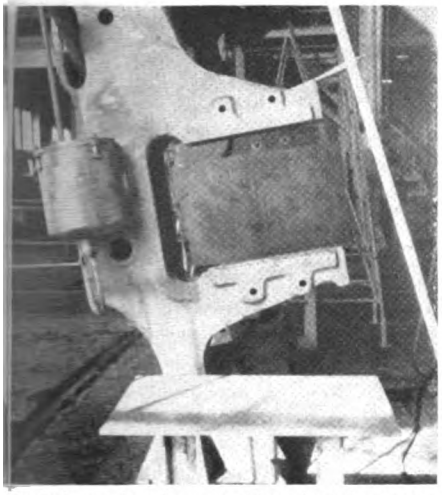
Truck frames with worn pedestal jaws are moved to two tip-up stations in the east end of the shop so down-hand welding can be done. Each station is equipped with a 6-ton crane and turntable so one man can position and reverse the frame. All rebuilt trucks have the pedestal jaws restored to original dimensions. The bottom four jaws on one frame are welded initially. While the frame is being reversed, the welder moves to the second frame where he welds the bottom jaws before he returns to the first frame which



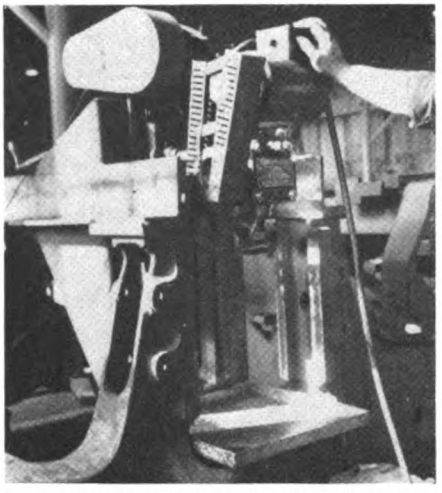
Gear cases get thorough rinsing after removal from vat to remove all residue and cleaning solution.



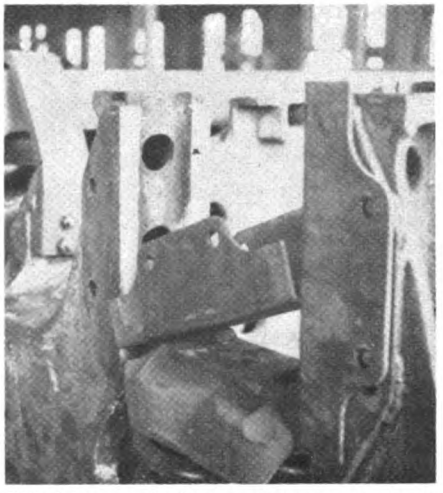
Filtering machine is installed behind the cleaning vat shown on front cover. Settlings are continuously discharged into refuse hopper.



Truck frame has been positioned at tip-up station for welding of the lower pedestal jaw.



Truck jaws are milled to new truck dimensions by cutter which moves up and down jaw face.



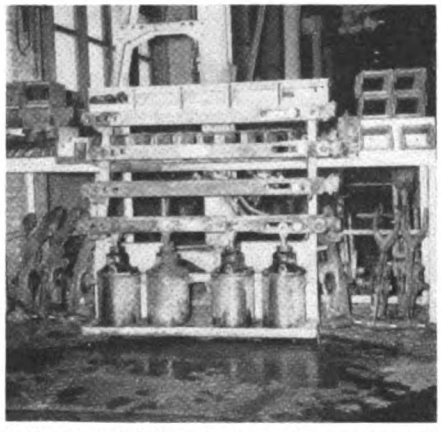
Milled jaw, equivalent to those on new truck, is ready for the application of new liners.

can then be completed. Platforms at each station permit down-hand welding of the upper jaws. Truck frames were previously welded vertically in an upside down position on the floor. This required 8 hr for two welders on one frame. With the tip-up arrangement, one welder can finish a frame in 8 hr.

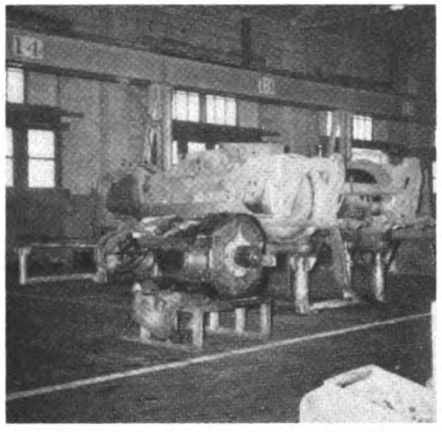
After welding, truck frames are placed upside down at work stations where a Dunmore Versa-Mill is used to face the pedestal jaws. Cuts vary in depth from 0.060 to 0.070 in. An adjustable-speed pulley equipped with a V-slip belt varies cutter speed. Only one face on one side of the jaw is machined with the present cutter. Generally, one roughing cut is taken down the jaw and a finishing cut upwards. A heavier machine with a cutter that will mill one side of the jaw in one operation is expected to replace the present machine in the near future. It takes 8 hr to machine one four-wheel truck frame. The new cutter should cut this milling time in half.

Truck frames are then moved to assembly stations where Magnafluxed bolster hangers are ready for application. The Magnaflux equipment is mounted on a press so that bushing removal, examination for cracks, and rebushing can be done continuously. Traction-motor support lugs are welded. New bushings and pins are applied, brake rigging renewed, and turned, or new wheels and repair motors are mounted.

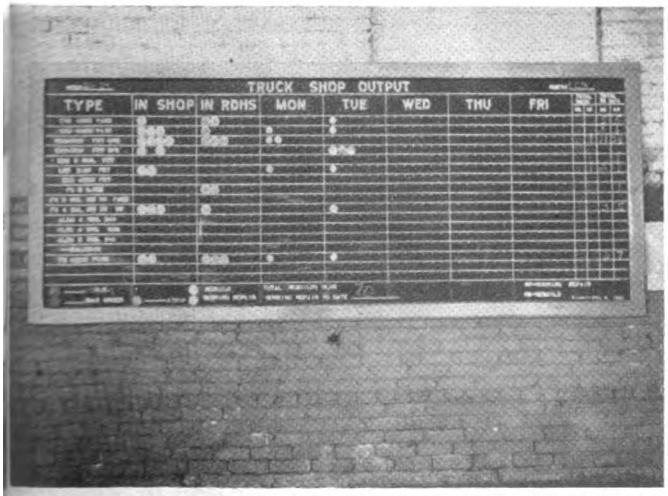
Locomotive wheel sets are installed in reconditioned traction motors in the area east of the welding tip-up stations (RL&C, June 1960, p 50). The assemblies are stored on portable stands east of No. 1 station and moved to rebuild stations when required for locomotives in the shop.



Racks at rebuild stations produce an orderly arrangement of all necessary parts.



Reconditioned traction motor is ready for application to truck brought in for running repair.



Inventory of trucks in shop, enginehouse, and under repairs is shown by board which also indicates progress of work.

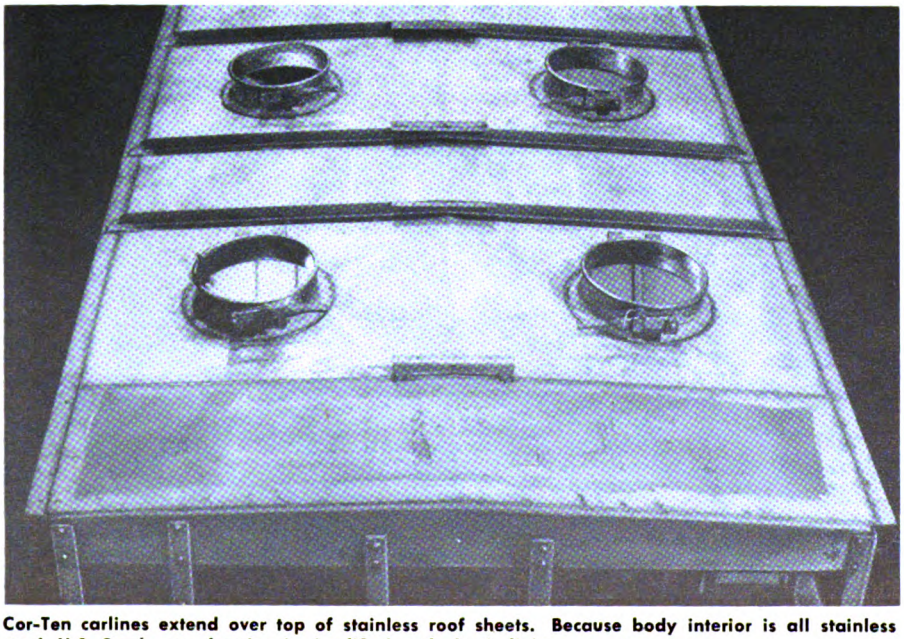


Trucks enter shop at far end. Rebuild stations are in left foreground. The stripping and milling stations are on the right.



Stainless-steel body is used in conjunction with Cor-Ten body structure and Tri-Ten center sill. Car is almost completely welded.

SP Tests Stainless Covered Hopper



Cor-Ten carlines extend over top of stainless roof sheets. Because body interior is all stainless steel, U.S. Steel says cleaning is simplified and plastic linings are unnecessary.

The Southern Pacific is putting into revenue service the first Tenelon stainless-steel covered hopper car recently completed for the United States Steel Corporation by Pullman-Standard. All body components which contact the lading are of USS Tenelon—a stainless steel with design strength about twice that of conventional austenitic stainless steels.

Because of this higher strength, it was possible to use thinner, lighter sheets of Tenelon to fabricate the car's hoppers, floors, side sheets, roof, and hatch covers—all components which come in direct contact with the lading. U.S. Steel says the new car is about 15% lighter, yet equal in strength to conventional covered hopper cars made from structural carbon steel, high-strength steel, or even other grades of stainless steel.

The car is intended to make possible economical shipment of bulk materials. The corrosion resistance of the body will enable the car to carry a range of bulk materials from chemicals to food products without the linings frequently needed in carbon-steel covered hoppers. In addition, U.S. Steel says, the stainless body is especially designed to protect shipments from contamination. Engineers point out that in the car's all-welded Tenelon hoppers there are no areas where particles of one shipment could lodge to contaminate a subsequent shipment of another material. A thorough washing or cleaning between shipments will "make the car kitchen clean and ready for the next load."

The 90-ton car has a capacity of 3,750 cu ft and a light weight of 58,500 lb. The original design called for a light weight of 56,500 lb, but this was subsequently increased intentionally so that it would not be necessary to use empty-load brakes. Weight of a comparable carbon-steel hopper is about 70,000 lb.

For those parts of the new car which do not come in contact with the lading, designers used two USS high-strength, low-alloy steels. USS Tri-Ten was chosen for the center sill because of its strength-to-weight ratio and impact resistance. Cor-Ten is used in the side sills, side posts, and various other structural components in the underframe, roof, and ends of the car.

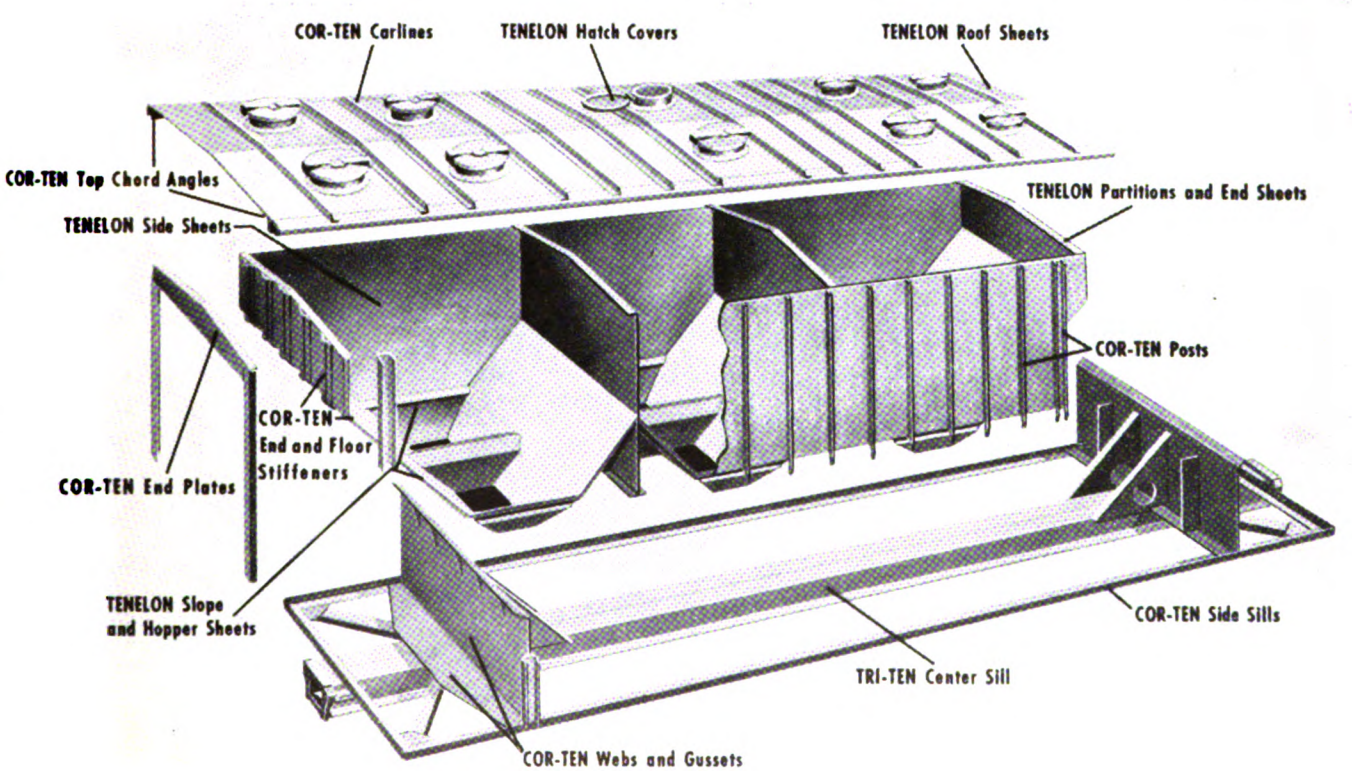
In discussing the car recently completed at the P-S plant in Butler, Pa., USS officers were quick to emphasize that there are no unusual design features—that the car represents the utilization of a new material in a conventional car design. The car is "an effort of U.S. Steel to promote its material on behalf of all carbuilders," it was explained. The material should provide railroads with "a material for carbuilding that is within the limits of what they can economically justify." U.S. Steel is not entering the carbuilding business.

Tenelon is a manganese-chromium-nitrogen stainless with no nickel and very low carbon content. It has a high yield strength in the annealed condition. Its yield strength—almost twice that of the 18-8 grades of stainless steel—is 70,000 psi. Ductility is close to that of familiar stainless grades. Tenelon, according to U.S. Steel, has mechanical advantages and properties that lend themselves to solving engineering problems involving strength and corrosion resistance.

The steel company officers anticipate widespread use of Tenelon in future car construction. Among other things, they say, the new stainless alloy provides an answer to the competition with aluminum. Several covered hoppers with aluminum bodies have been placed in service in recent months.

The car's inside length is 41 ft ¾ in., and inside width is 9 ft. 11 in. Outside, the car is 47 ft ¾ in. over strikers and 14 ft 6 in. over running boards. The trucks are fitted with roller bearings and 36-in. wrought-steel wheels. A coded paint scheme has been used in the prototype car to designate the structural alloys. Body sheets of production cars would not require paint.

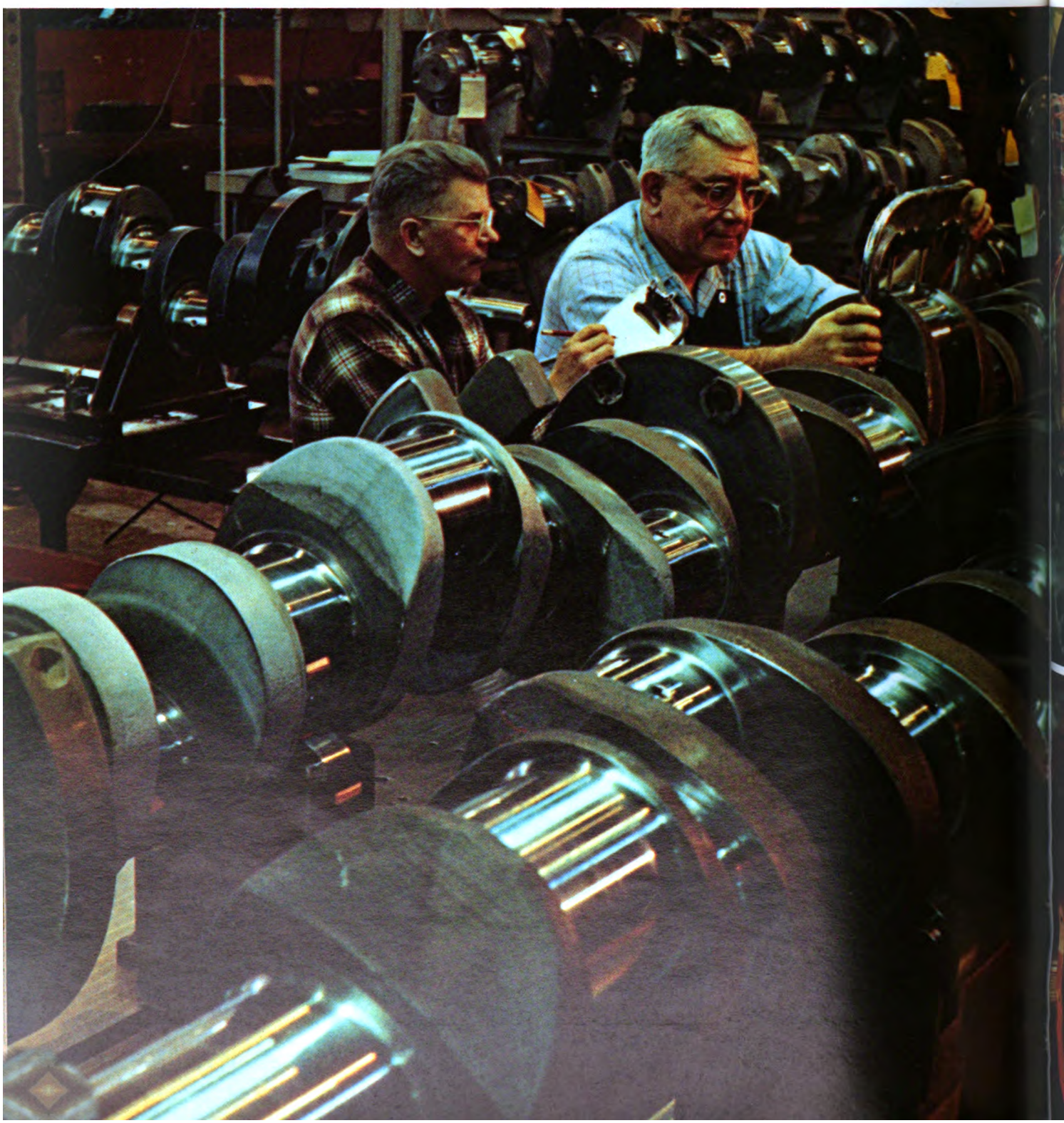
Initial cost of materials in the car compares favorably with that paid for conventional construction. First costs will be virtually the last cost, according to USS spokesmen. The car, they say, "should last indefinitely." Following the SP operation, the prototype covered hopper will be available for service tests by other railroads and shippers.



Steels utilized in construction of new covered hopper were chosen because of special characteristics which solved various design problems.

Electro-Motive announces new facilities for complete

CRANKSHAFT REMANUFACTURING



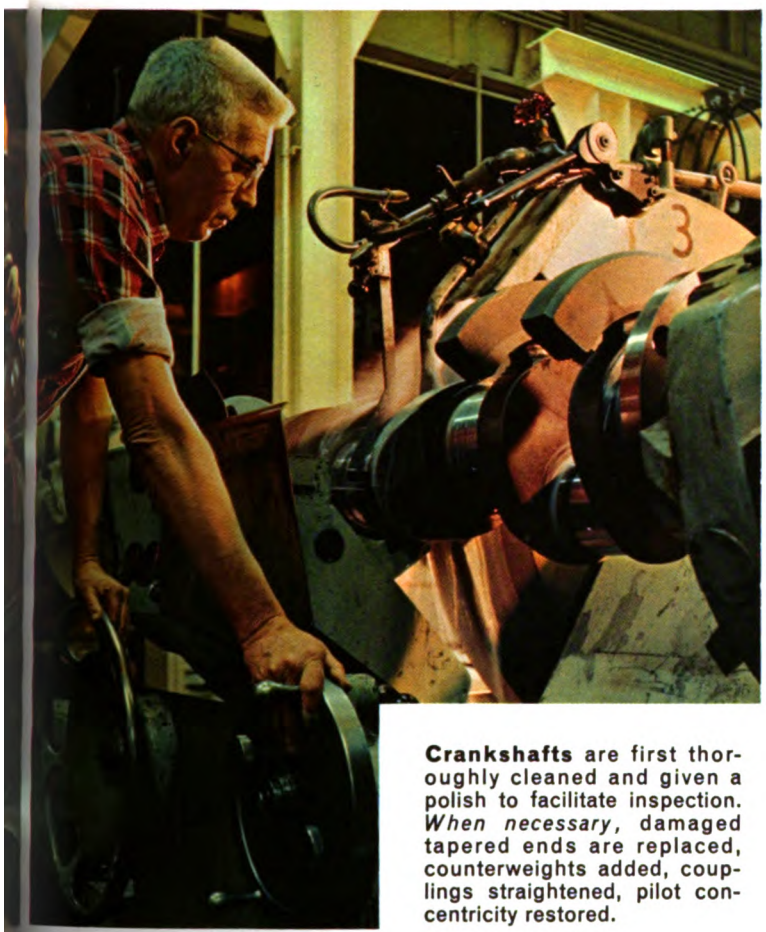
At La Grange, Electro-Motive builds new life into worn crankshafts. At each exacting operation, skilled workmanship is combined with modern, specialized tooling and rigid quality control. This is why Electro-Motive can offer new product warranty with every remanufactured crankshaft. Call your Electro-Motive Representative today for complete information.

61-R-8

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GENERAL MOTORS LOCOMOTIVES



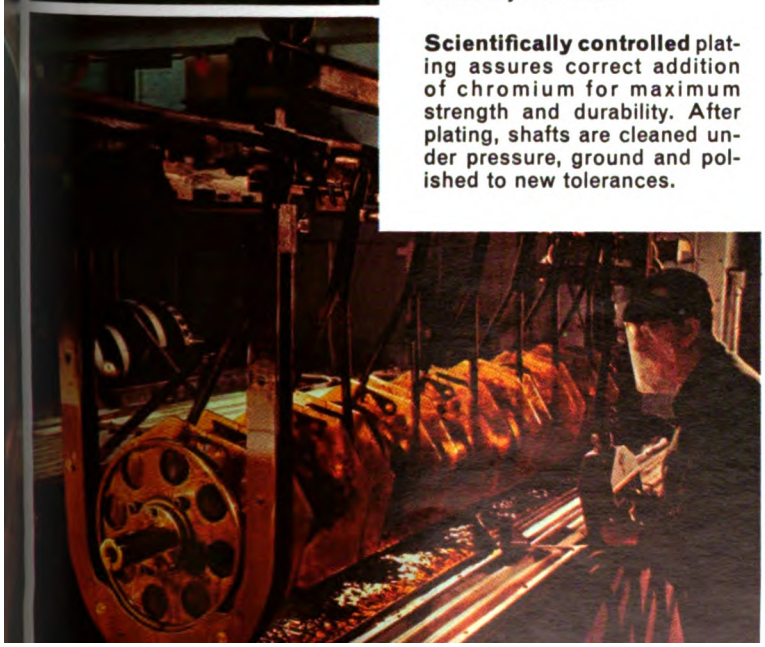


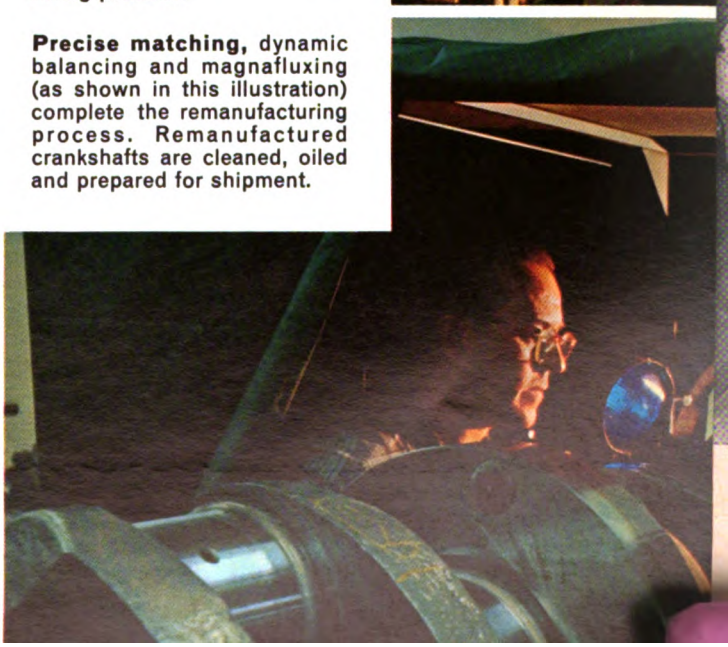
Crankshafts are first thoroughly cleaned and given a polish to facilitate inspection. *When necessary*, damaged tapered ends are replaced, counterweights added, couplings straightened, pilot concentricity restored.

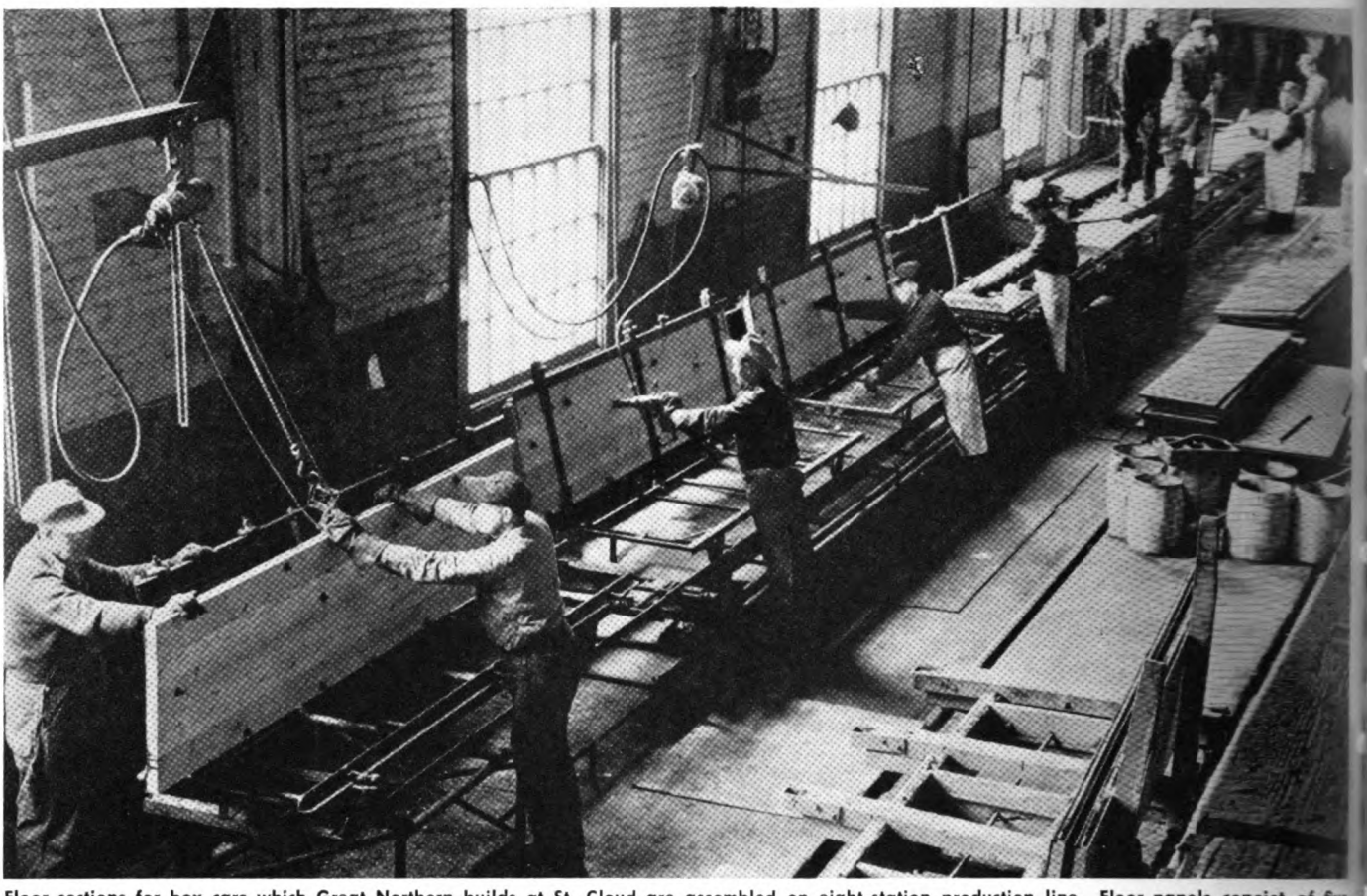
Precision equipment such as this straightening press, as well as special equipment for stress relieving, magnaflux inspections, controlled shot peening are all utilized in Electro-Motive's complete remanufacturing process.

Scientifically controlled plating assures correct addition of chromium for maximum strength and durability. After plating, shafts are cleaned under pressure, ground and polished to new tolerances.

Precise matching, dynamic balancing and magnafluxing (as shown in this illustration) complete the remanufacturing process. Remanufactured crankshafts are cleaned, oiled and prepared for shipment.





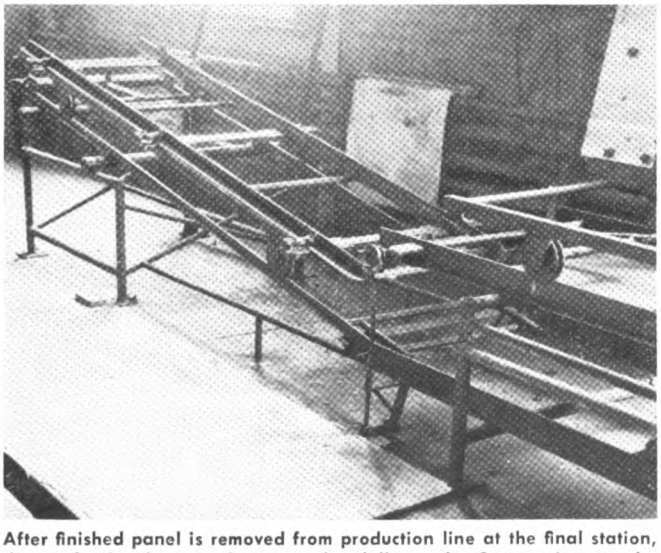


Floor sections for box cars which Great Northern builds at St. Cloud are assembled on eight-station production line. Floor panels consist of five boards and perforated steel flooring plates. Several styles of panels must be utilized in each type of car.

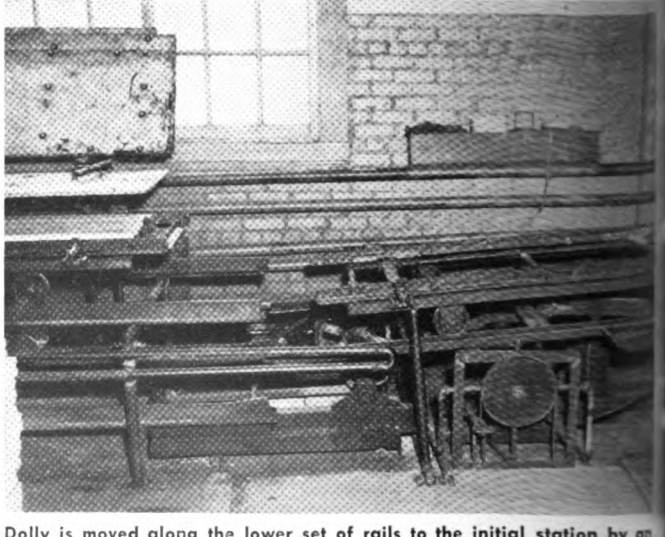
How Great Northern Prefabricates

An assembly-line procedure is used in prefabricating sections of flooring for box cars constructed at the Great Northern shop at St. Cloud, Minn. These floor panels consist of tongue-and-groove lumber and Standard Railway Equipment steel floor plates.

There are 14 panels per car, of three different sizes. The three types differ chiefly in the location of holes for bolts which attach the panels to the underframe at different locations in the car. During the assembly, all possible bolts are applied, leaving only those needed to secure the panel to the underframe. The panels are then bolted to the side sill and clipped to the floor stringers during assembly of the cars.



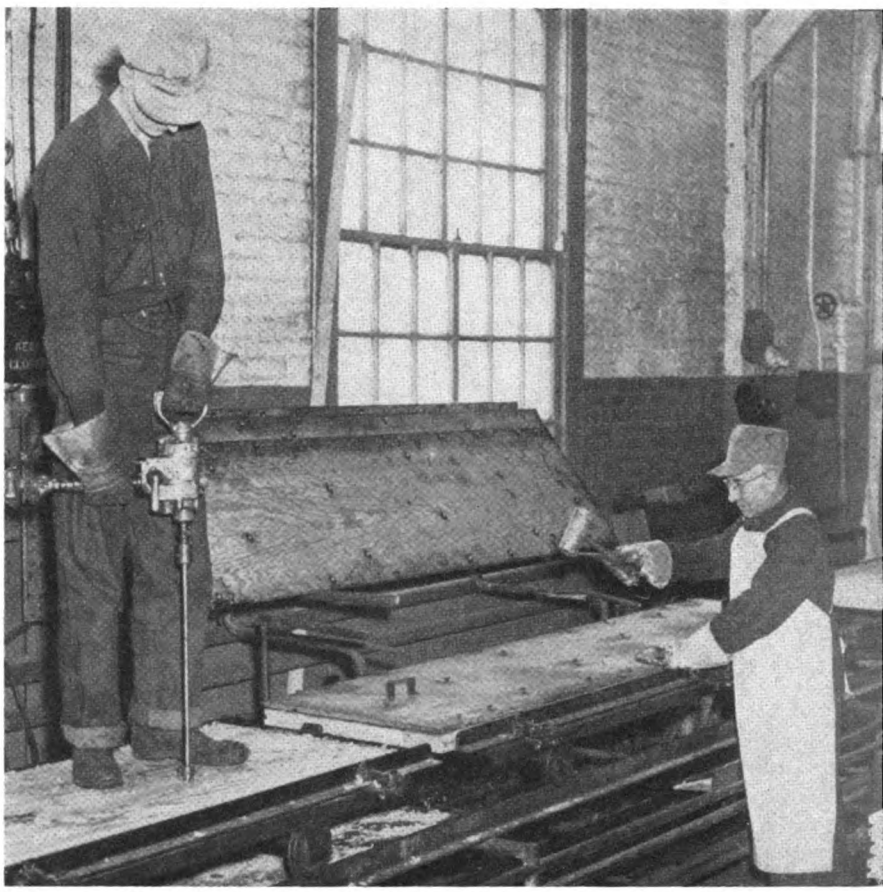
After finished panel is removed from production line at the final station, the track tilts down and returns the dolly to the first station on the lower set of rails in preparation for another panel.



Dolly is moved along the lower set of rails to the initial station by an endless belt which runs the length of the production line. Dolly is then elevated to the rails on the working level.

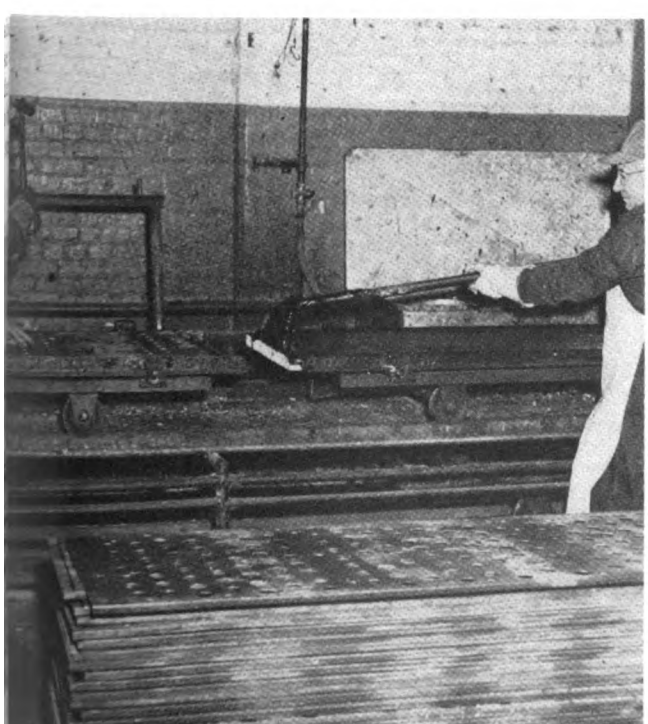


First step in production of panel is forcing boards together n jig. Flooring is cut to proper length.

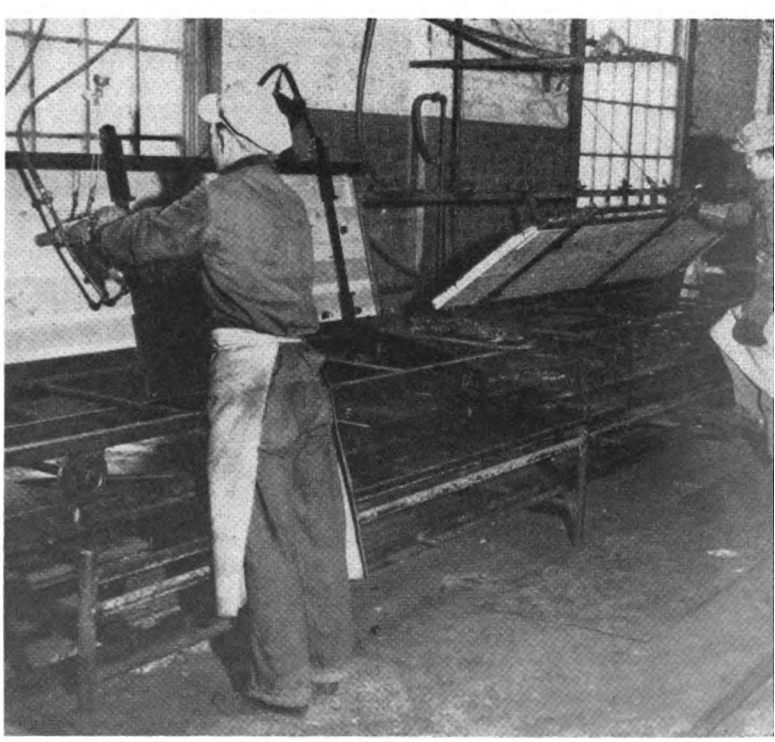


Holes are marked on wood panels by tapping loose fitting pins in template at second station on production line. Holes are then drilled for steel plates.

)oring Panels for Box Cars



Mastic is brushed on the floor panel at Station 4 before the steel plate is applied at Station 5. After the plate is in place, the bolts are driven through it.



Panel is raised on its side at Station 6 and nuts are run on the bolts already installed through boards and steel plate. At next station, the nuts are tightened with an impact wrench.

300-Ton Flat Car Built by D&H

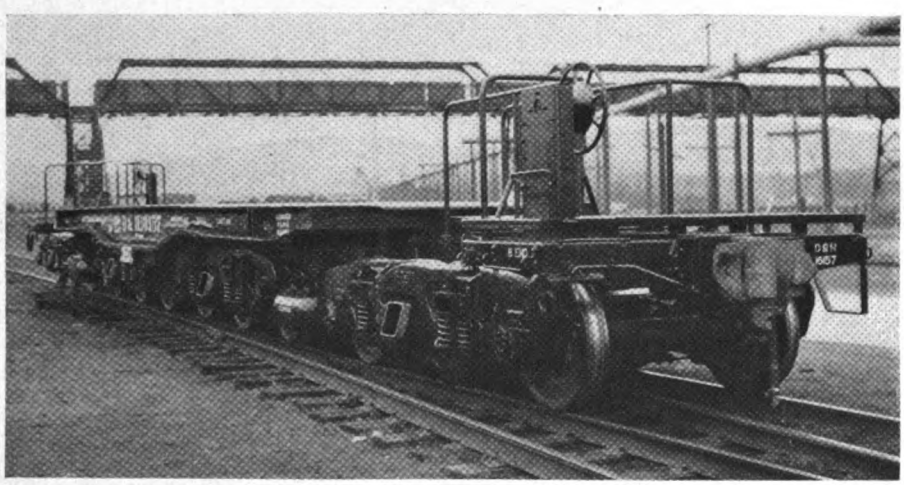
Car can carry loads which previously were beyond the capacity of any U. S. freight car

The world's highest capacity flat car recently completed its first transcontinental trip from the General Electric plant at Schenectady, N. Y., to Bellflower, Cal. The car, designed and built by the Delaware & Hudson, carried a 535,000-lb GE turbine during its first revenue movement—the trip to Bellflower. According to J. P. Hiltz, Jr., D&H vice president—operation and maintenance, the car was designed by D&H engineers and was built by the road's car shop at Oneonta, N. Y.

The *Railway Equipment Register* currently lists over 750 heavy-capacity and special-type flat cars in service in the U.S. and Canada, but none has the rating of this unit.

The 300-ton capacity of this new car is the highest on American railroads. Other heavy duty and depressed center cars on U. S. roads have a maximum capacity of 250 tons. The car cost $110,000, Mr. Hiltz reports. It will be available for transporting all types of machinery too large for other cars.

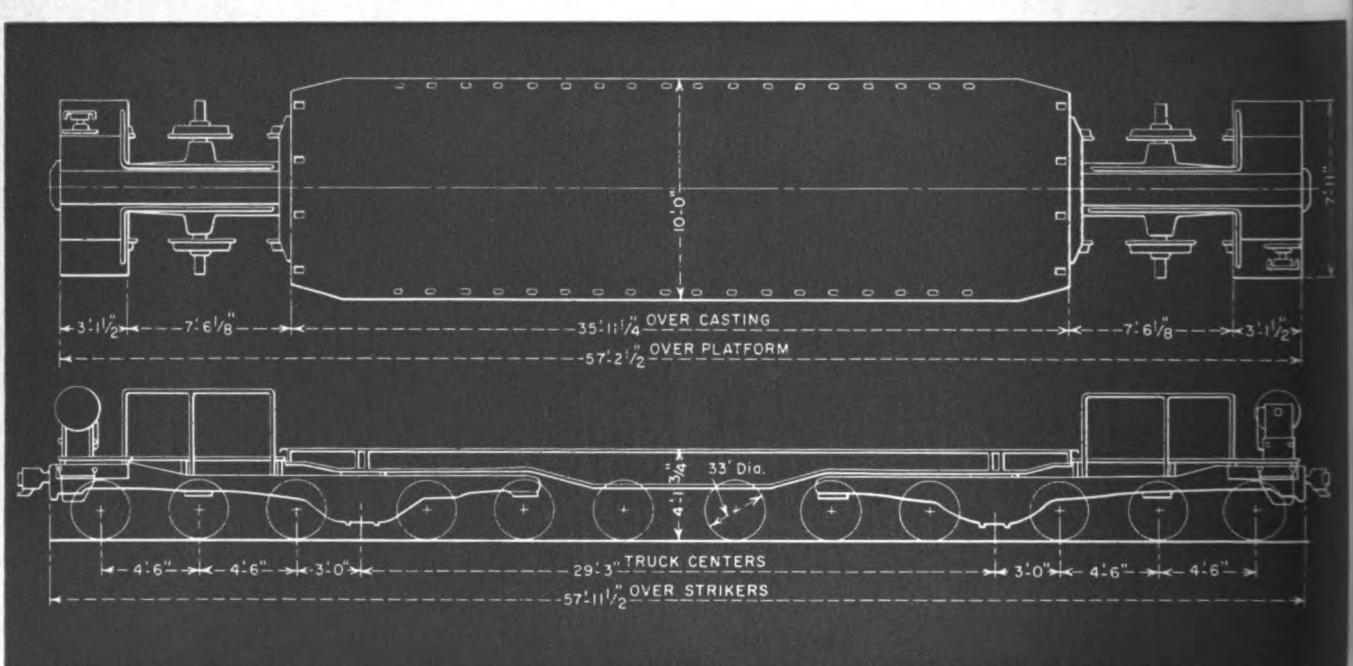
The load platform is cast nickel steel produced by General Steel Castings Corp. It is 35 ft 11¼ in. long.



Pair of trucks under each end of the car carries span bolster which supports one end of load platform casting. Each end of car has separate air-brake system.

PRINCIPAL SUPPLIERS OF EQUIPMENT

American Car & Foundry, Div. of ACF Industries, Inc.
American Steel Foundries
Bethlehem Steel Co.
Buckeye Steel Castings Co.
Chicago Railway Equipment Co.
Ellcon-National, Inc.
General Steel Castings Corp.
W. H. Miner, Inc.
National Malleable & Steel Castings Co.
New York Air Brake Co.
Standard Railway Equipment Div. of Stanray Corp.
Timken Roller Bearing Co.



"Biggest" flat car was designed by D&H mechanical department and assembled at D&H car shop. It is now available for all types of heavy loads. It is designed for 300 tons. Previous U. S. top carrying capacity was 250 tons.

10 ft wide, and its top is 4 ft 1¾ in. above the rail.

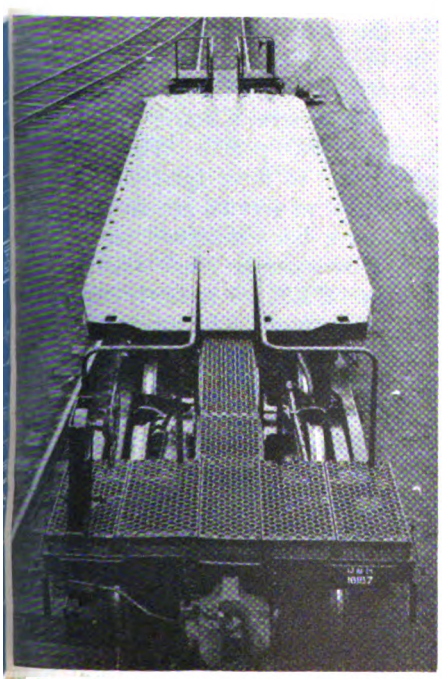
This load platform is carried on a pair of span bolsters which rest on four six-wheel trucks. Trucks are equipped with 6½- by 12-in. heavy duty roller bearings and 33-in. multiple-wear wheels. Each end of the car is fitted with a separate AB brake installation and Peacock handbrake. The car has Type F interlocking couplers. Span bolsters are topped with safety walkways and handrails, and the car complies fully with all federal and state requirements, according to the railroad.

Weight of Car

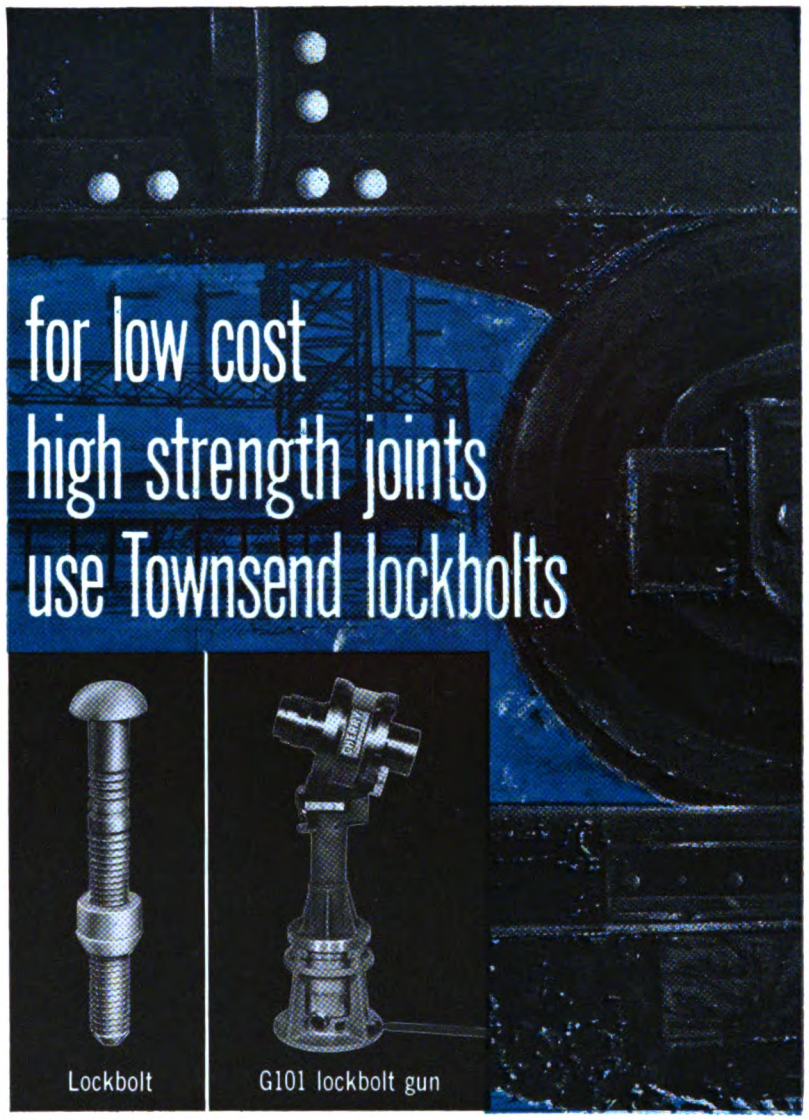
Overall length of the car over coupler pulling faces is 60 ft 6 in. The car weighs 148,300 lb and has a load limit of 604,700 lb, producing a maximum permissible rail load of 753,000 lb.

The turbine, which was the car's first load, was placed on board at GE's Schenectady plant on March 30. It moved over the D&H to Jefferson Junction, Pa., where it was transferred to the Erie-Lackawanna for the second leg of its journey to the Pacific coast.

Other roads which subsequently participated in this record movement were the New York, Chicago & St. Louis; Toledo, Peoria & Western; Atchison, Topeka & Santa Fe; Union Pacific, and Pacific Electric.



Stake pockets are provided at end of platform casting; tie-down holes are along the sides.



New car builders and repair shops get uniform, vibration-proof, secure joints at low installed cost with Townsend lockbolts.*

Townsend lockbolts are easy to install with a 2 or 3 man crew. Ordinary type fasteners require larger, more costly, highly specialized crews. Increased driving speed and the elimination of fitting-up operations step-up production. Worker fatigue is minimized.

A demonstration—in your office or on the production line—can be easily arranged. Our field engineer will demonstrate the practical and long lasting benefits of Townsend lockbolts. Write Townsend Company, Engineered Fasteners Division, P. O. Box 71-EE, Ellwood City, Pennsylvania.

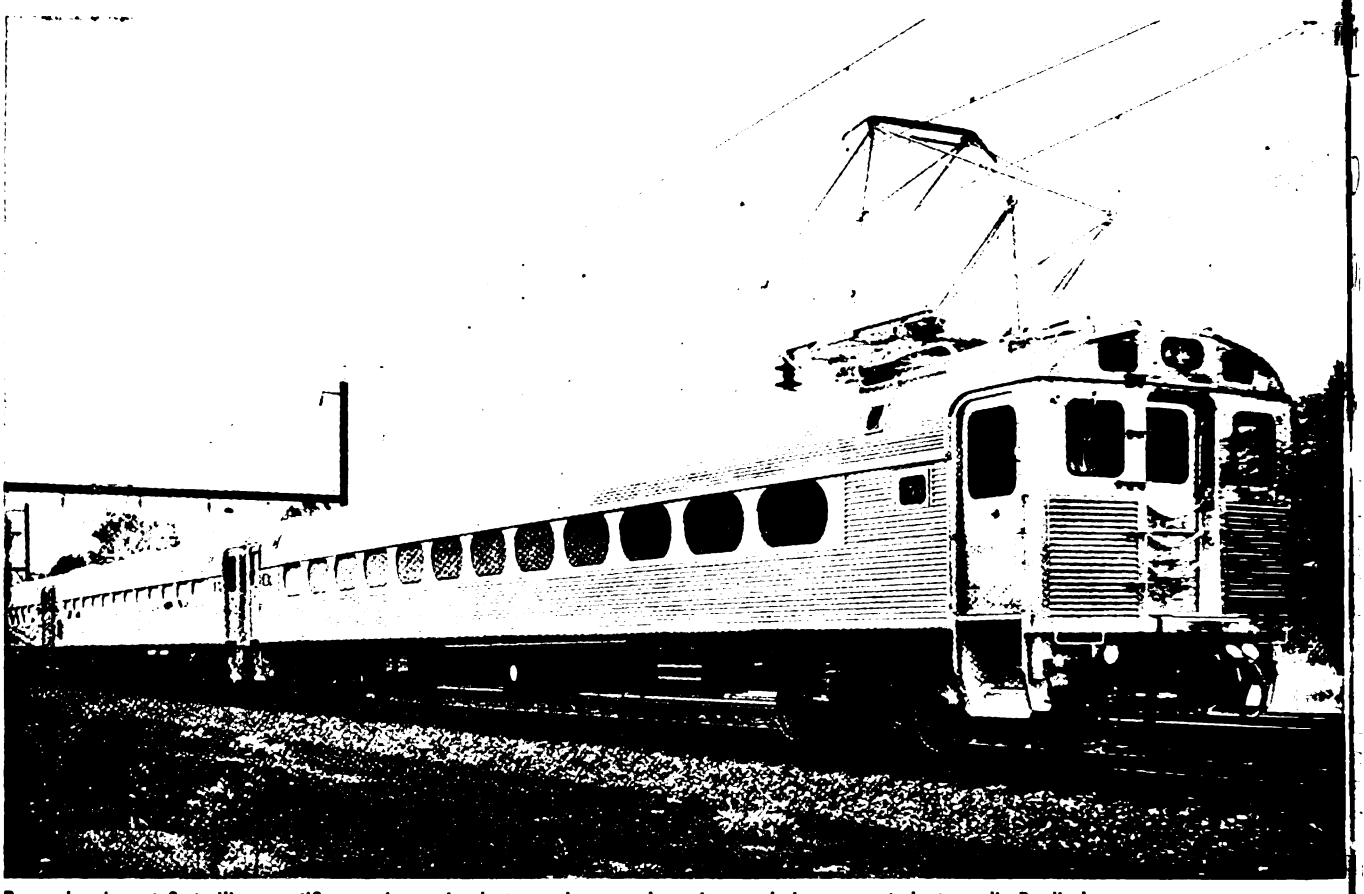
*Licensed under Huck patents RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049; and 2,754,703.

Townsend Company

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Pennsylvania put first silicon rectifier car in service last month; second car is now being converted at road's Paoli shop.

U. S. Roads Test Silicon Rectifiers

Silicon rectifiers have been installed on multiple-unit electric cars used for suburban service by the Pennsylvania and the New Haven. In both cases these semi-conductor rectifiers are replacing Ignitron (mercury-arc) rectifiers which were standard equipment for the cars when they were built in 1958 and 1954 respectively.

These are the first U. S. applications of an increasingly popular method for rectifying high-voltage alternating current to direct current on rolling stock equipped with d-c traction motors.

Lighter weight, simplified cooling, higher efficiency and longer life are among the reasons given for the application of semi-conductor rectifiers.

For some time an experimental 5,000-hp electric locomotive with this type of rectification equipment has been operated on the French National Railways. "This equipment has given complete satisfaction," M. Tessier, electrical engineer of the French National Railways reported recently. The French National was scheduled to receive fifteen 3,600-hp B-B type, silicon-rectifier freight locomotives last month. A substantial number of stainless steel commuter cars equipped with silicon rectifiers are also in operation in France.

The first U. S. application was made on a Pennsylvania Pioneer-type, multi-unit car (RL&C, August 1958, p 21). Ignitrons on this car were replaced by silicon rectifiers supplied by Westinghouse Electric Corp. Work was done at the Pennsy's Paoli, Pa., car shop in March. Conversion of a second car is now in progress.

The rectifier with its 56 diodes is mounted in front of the air intake for the traction motor blower fan. It is possible to eliminate the liquid cooling system which is needed with the mercury-tube rectifiers. This water-filled system includes a piping loop, pump, radiator, and anti-freeze protection.

Power from the catenary at 11,000 volts a-c is transformed to 780 volts a-c and is then passed through the rectifier where it is changed to 650 volts d-c for the traction motors.

If the silicon rectifier installations on the two PRR m-u cars are successful, the Pennsylvania will then apply silicon rectifiers to the 66 electric locomotives which are currently being built by General Electric (RL&C December 1960, p 50). While all these units were to have Ignitrons and the units now in service are so equipped, they have been designed so that the changeover can be made easily.

General Electric recently completed replacement of the ignitrons on one of the New Haven stainless-steel, multiple-unit cars with silicon rectifiers. A less complicated installation, reduced weight, and longer life were all goals. The silicon equipment weighs about one-third as much as the mercury-arc equipment, GE reports. In addition to eliminating the liquid cooling, there are no firing circuits. Preliminary work indicates that the silicon rectifier should last considerably longer than the Ignitron tube which has been found to have a 7-yr life.

Doc Discusses Effects Of Traction Gear Wear

By Gordon Taylor

The diesel maintainers were having a meeting of their local diesel club. They reported and discussed various types of trouble. One man was having engine failures involving scored crankshafts; another reported an epidemic of control wiring troubles. In the second case, it had finally been decided that, after years of service, it could be expected that wire and cable insulation would deteriorate to a point where rewiring would be cheaper than expensive train delays.

Pat Parker, a foreman from the Gulf Route, got the floor. "I've listened to your troubles and, while you have my sympathy, you don't really know what troubles are," he began. "We have had all the ones you've talked about. But right now we are having an epidemic of traction-motor failures. When a six-thousand dollar motor has to be rebuilt or replaced, your maintenance appropriation drains away fast.

"It wouldn't be so bad if these failures were spread out, but they are occurring with greater frequency. It's a problem that's got our management 'all shook up' and that could result in our maintenance forces being all shook up, unless we can determine the cause and sell management a program that will yield dependable service at reasonable cost. I'd like some advice and am wondering if Doc Watts would care to comment."

"I'd first want to know more about your troubles," replied Doc. "Do the failures follow any particular pattern?"

"Well," said Pat, "numerous failures have involved failure of armature bearings. There have also been motor failures in which bearings were not locked or broken. Some failures seem to be due to chafed or weakened winding insulation, burned commutators, and loosened armature bands."

"From what you say," Doc commented, "it would seem that these motors hurt all over. What sort of care are you giving them?"

"We've been giving them the same general care we gave our diesels the first five years we had them," Pat replied. "Most troubles have occurred in the past six months. The motors are getting older, but I don't think age is the only problem."

"I'll agree with that," said Doc. "There's bound to be something else. Can you think of any changes in your maintenance procedures? How often do you get an opportunity to make a close inspection of the traction motors when they are out from under the locomotive?"

"When we first got diesels," Pat replied, "we gave the motors a pretty close inspection each time they were removed from the truck for wheel changes. We would give the motor a thorough cleaning without dismantling and would motor it on the shop floor with current from a welding machine. We had an opportunity to check armature bearings for noise to check commutators to see if they were running true. It also gave us a chance to inspect motor pinions. None of these inspections cost much after the motors had been removed."

"If you continue these practices, it should keep you out of a lot of trouble," Doc said.

"Well, some things have changed," Pat explained. "We still make motor inspections at wheel changes, but they don't happen as often as they used to. We got a wheel-truing machine about two years ago that enables us to grind out flat spots on wheels and to restore the proper tread contour without having to remove the wheels from the locomotive. This enables us to get the locomotive back to service with much less 'out-of-service' time."

"That's right," Doc agreed, "but it doesn't give you a chance to make intermediate inspections that could lengthen traction-motor service life. It eliminates one opportunity for detecting and replacing motor bearings that are getting noisy and are potential failures. You don't have a chance to check the teeth of motor pinions and axle drive gears. Because pinions turn several times faster than axle gears, the wear on the pinions is much greater.

"It's my feeling that most railroads aren't paying as much attention as they should to pinions and gears. Too often the inspection stops when it is determined that there are no broken gear teeth. How many inspectors look carefully at the contour of the teeth of traction-motor pinions? It doesn't take long, and the dividends are big, if you do something about what you see. Careful inspection of gears and proper corrective action can do more for the welfare of your traction motors than almost anything else. Many motor failures are caused by the punishment inflicted by bad gearing.

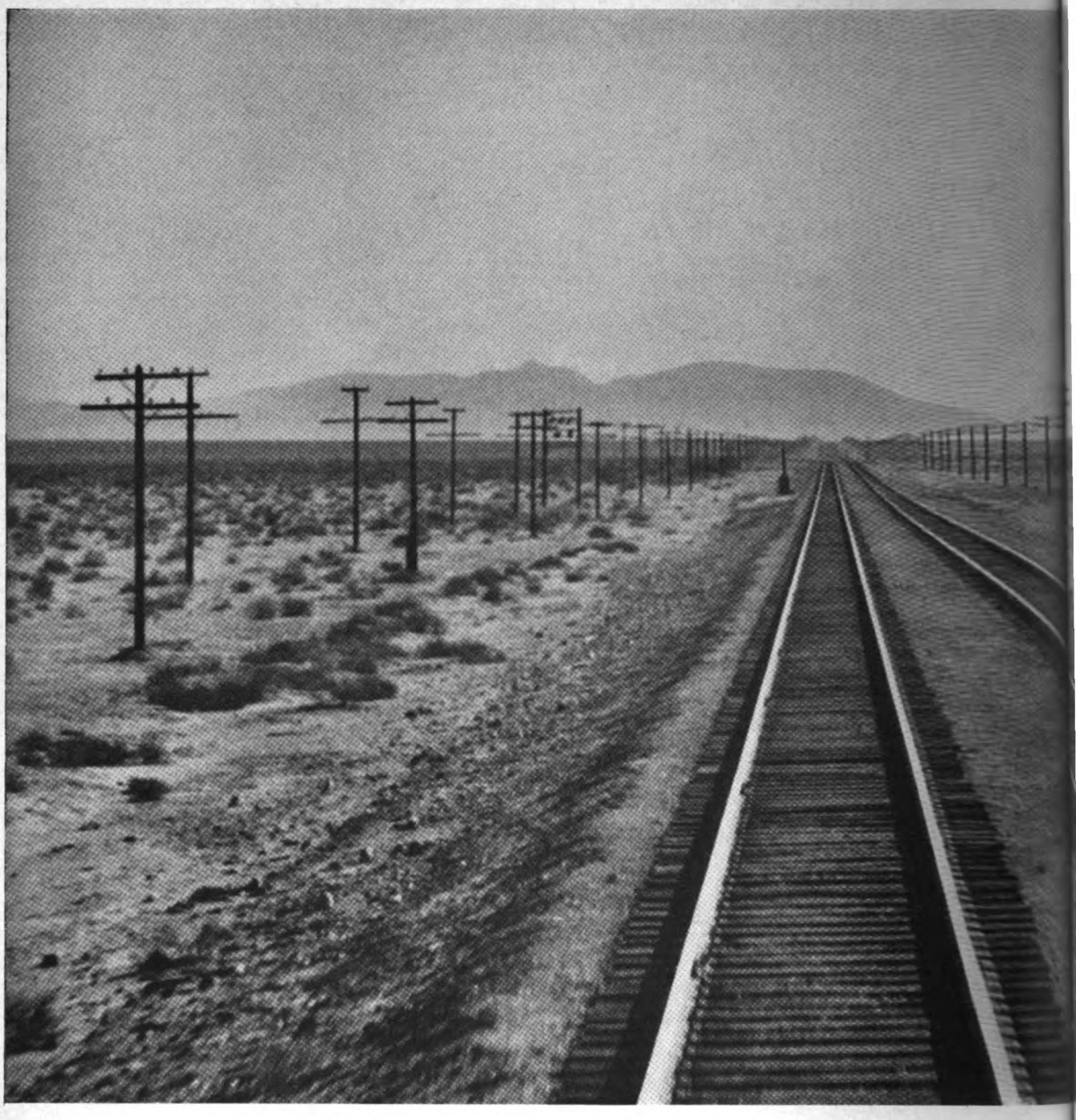
"A good gear inspection can only be made when the motor is out of the locomotive. Many inspectors then fail to clean the gear teeth properly to check their condition. Although gears are covered by a sticky lubricant, don't let that stop you. The gear and pinion, like most diesel parts, have a story to tell the inspector, but they can tell it only when the part has been properly cleaned for a thorough inspection. You need to clean only two or three teeth to find out what is happening. Be careful how you go about this cleaning. The gear lubricant may hide jagged edges or very sharp burrs. It's best to wear heavy gloves and apply the solvent with a brush or plenty of rags.

"A damaged tooth profile will show a ridge across the face of the tooth. Some maintainers use templates or gages to help them judge the shape of the tooth. These templates are ground to fit correctly shaped teeth. When the template is placed against the face of the tooth, any change of shape is easily detected.

"On a badly worn gear you will usually find a 'shoulder' or 'step' at

(Continued on page 32)

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.



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(Continued from page 29)

the base line. It does no harm as long as the same gear and pinion remain mated on the same gear center, for one has worn a pocket for the other, and they could continue to work together for a time. But when wheels are changed, the gear and pinion will be working with new partners. Then that 'step' on the worn gear can interfere with the tip of the tooth on a mating gear. The result is a clashing of steel on steel which no lubricant can prevent.

"New gears can be ruined when run against badly worn gear. Under these conditions, it should be no surprise if a tooth breaks or if armature parts or windings fail. In fact, defective traction gears will not keep their troubles to themselves. They insist on sharing them with every part of the driving motor.

"The teeth of a set of traction gears are formed in what is known as an involute shape. Because of this, the point of contact between pinion and gear always falls on the 'line of action.' Just imagine that the gear and pinion were two pulleys being belt driven. Then the line of action on the gears is the same as the position of the belt on a pulley drive. Under these conditions, power is transmitted smoothly, the gear and pinion acting like two pulleys connected by a non-slipping belt.

Now suppose you have a set of gears so badly worn that the involute shape is gone. That line of action is no longer constant. The action line jumps around like a belt on two flat sided pulleys. For this reason, worn gears set up terrific vibrations which travel to all parts of the motor. They enter the roller bearings of the armature, shortening their service life. The vibrations pass through the motor shaft into the armature core and into the windings, causing coil movement which chafes insulation. Vibrations also carry through to the armature head, causing balance weights to loosen in the magnet frame, breaking field coil and brush holder connections. You can imagine how they cause brushes to dance and ruin commutators."

At this point Pat stopped him. "You speak of these terrific vibrations. Can you give us some idea of what you mean by terrific?"

"Be glad to," answered Doc. "Consider for a moment that we have a 15-tooth motor pinion operating at 50 mph. My data book, which I am consulting, shows that a freight unit with 40-in. wheels and 62 tooth gear will have a motor speed of 1,720 rpm at 50 mph. A worn 15-tooth pinion operating at 1,720 rpm will be pounding at the shaft 1,720 times 15, or 25,800 blows per minute.

On a passenger unit with 20-tooth pinion running at 70 mph, the motor will operate at 1,862 rpm. On this unit, a bad pinion will be pounding at the shaft 1,862 times 20, or 37,240 blows a minute. At that rate, in thirty minutes the bad pinion will have delivered over a million blows into the armature and its related parts.

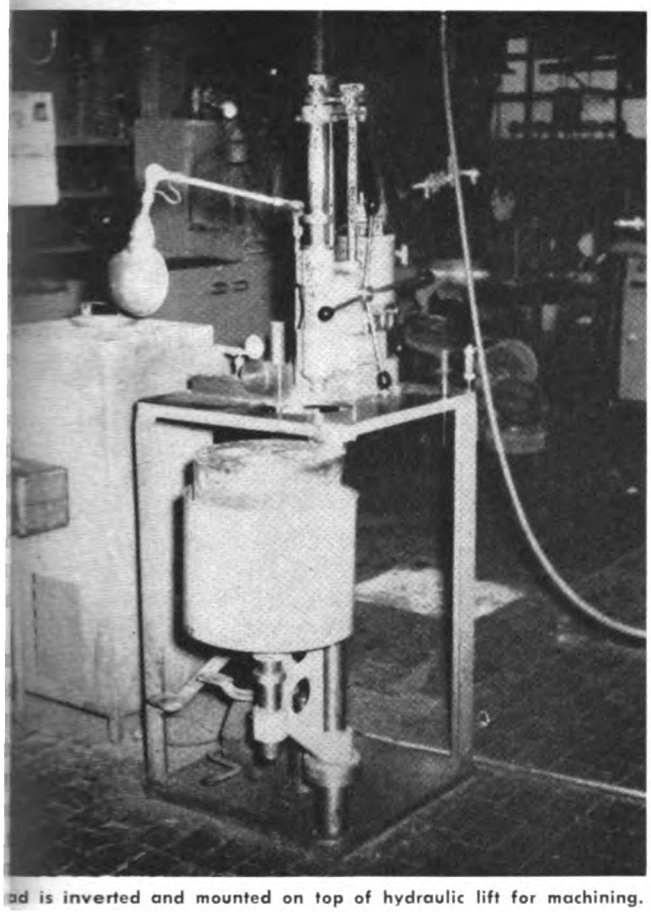
"Remember the old saying, 'The constant drip of water can wear away the hardest stone.' Of a diesel, it may be said that the constant pound of driving gears will eventually KO a traction motor.

"Now, Pat," Doc continued, "I believe that, while your wheel-truing machine is saving you money on wheel changes, it may be the indirect cause of traction-motor failures by depriving you of the opportunity to clean, inspect, and check traction motors as frequently as you did a few years ago.

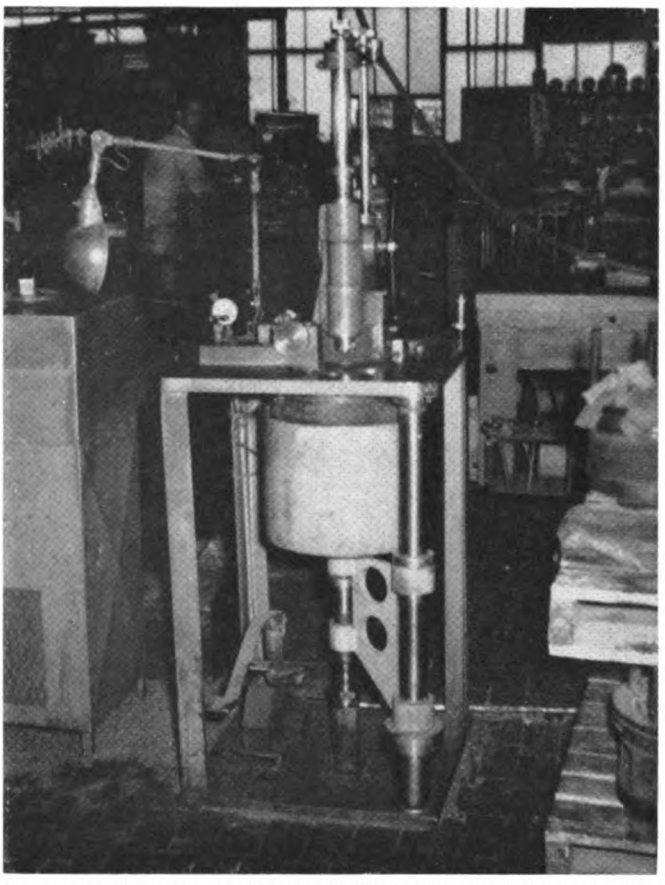
"More frequent inspections of motors while they are out of the trucks will not cure all the troubles, unless the gears are carefully inspected and appropriate action taken to correct what the inspections reveal. There is no hard and fast rule on when to replace gears. It depends on class of service and operating speeds. On a switcher, in slow speed service, the damage caused by bad gears would not be as severe as that developed by high-speed road service.

"When we started this discussion, Pat, you said your management was all shook up by your traction-motor trouble. It's my opinion that your traction motors are also all shook up by having to run too long with defective gears. I recommend that your people study this situation to see whether it would be better to save all the money on wheel changes, or whether it would be better to set up a program that recognizes the need for some intermediate inspection of traction motors and gears. Certainly the wheel-truing arrangement has advantages, but there is also need for a program that allows proper motor inspection.

"Locomotive builders recognize the importance of good gears for satisfactory performance of their products and would be able to offer some good advice."



ad is inverted and mounted on top of hydraulic lift for machining.



Boring of valve seats progresses rapidly because of indexing device.

anta Fe Shop Solves Its Problem...

:conomical EMD Head Reclamation

Extensive tests showed the Santa : that reclamation of EMD cylinder- :ad exhaust-valve seats could be an onomical procedure if the labor ısts could be reduced. The Cleburne, :x., shop has developed equipment hich more than doubles the output of :ads in which valve seats require rec- mation.

When the Kwikway Model Fx cyl- der-boring machine was first put in :rvice at Cleburne and used for in- :rt work, each valve seat had to be :t up individually with its guide be- ıre it could be bored accurately to re- :ive the insert. It had been found that :curacy had to be maintained so that ıserts would not fail in service.

Setting up the cylinder-boring ma- ıine in this way was very slow and ıe cost of reclaiming each head was pproximately $23.68. Because it was ossible only to machine four or five eads during an 8-hr shift, the high :clamation cost resulted. It was de- ided to speed this machining up to cut the labor cost. Material costs are constant.

A jig with a flat surface top was designed to position the boring machine. This top is bored to fit the firing ring surface of the head. Under it is a revolving pivot which fits the injector cavity in the inverted head. Below this pilot is a foot-operated Studebaker PV-3 hydraulic unit which lifts the head into place and holds it against the top plate with approximately 1,000 lb pressure.

Indexing Device

On top of the table is an indexing device which makes it possible to aline the boring machine over the adjacent valve-guide hole. With the indexing shaft in place in one valve-guide hole, the boring machine can be alined with the next valve guide by using mandrel which fits the boring machine's toolholder. The boring device is then located centrally over the valve seat to be bored and is tightened on the table. With 700 psi pressure in the hydraulic cylinder, the head is fixed during boring. After the boring machine has been tightened on the top plate and the indexing guide correctly positioned, all succeeding heads can be indexed and bored from this setting.

To apply these inserts, it is necessary that they be cooled so they will shrink to fit the hole bored for them. Not having access to dry ice, Cleburne shop rebuilt one of the refrigerated drinking-water coolers used in diesel locomotive cabs. The water-storage chamber was removed and a receptacle for holding the inserts was encased in the freezing coils of the unit. This container has a capacity of approximately 50 inserts. It has proved to be a very satisfactory device for preparing the inserts for installation in the head.

With the new procedures and tooling, Cleburne was able to increase production to 12 heads per 8-hr shift.

REA Express Testing Container Cars

Containerization in various forms is being investigated and utilized by REA Express in its intensive effort to develop a profitable method for handling small package shipments. REA Express, successor to the Railway Express Agency, has just begun an experimental operation, between New York and St. Louis over the Pennsylvania. Two newly developed container cars are being used.

One of these cars is a General American G-85 piggyback car equipped to handle twenty 212-cu ft Fruehauf containers. The other is a Pullman-Standard 85-ft skeleton container car designed to handle sixteen 261-cu ft Trailmobile containers.

The ability to load and unload containers rapidly is an important feature of the new REA Express program to overcome problems associated with economical movement of small shipments. On the New York to St. Louis run, one or more containers are removed at Dayton, Ohio; Indianapolis, Ind., and Terre Haute, Ind. Containers removed at these intermediate points will be loaded with New York shipments and will again be placed on the cars when they return on their eastbound trips.

Necessary rapid handling at intermediate points is made possible by REA-designed hydraulic, variable-height platform trucks. Containerized express shipments can be transferred to and from fast passenger trains during brief stops.

The General American G-85 piggyback car accommodates four demountable REA container rack-cradles which are cushioned on the Clejan shock absorbers that are built into the deck of the car for cushioning trailers and containers in conventional piggyback service (RL&C, Oct. 1959, p 27). This shock-absorbing mechanism has a maximum of 11 in. travel in each direction. The car is not changed structurally for use in the REA Express operation. For passenger service, it has been equipped with steam and train signal lines. Complete with racks, the 85-ft car's light weight is 71,000 lb.

The demountable rack-cradle, 20 ft by 8 ft, carries five containers in transverse channels. A screw-type, hold-down device raises and clamps each container in its two channels for rail movement, removing weight from the container's four casters which are used for rolling it on and off the car and for moving it on station platforms. The



Channel bridges on truck lower to meet corresponding channels on GATC rack-cradle.



Loading is completed as end stops are locked to secure container.



Four rack-cradles cushioned on deck of G-85 piggyback car hold 20 Fruehauf magnesium containers.

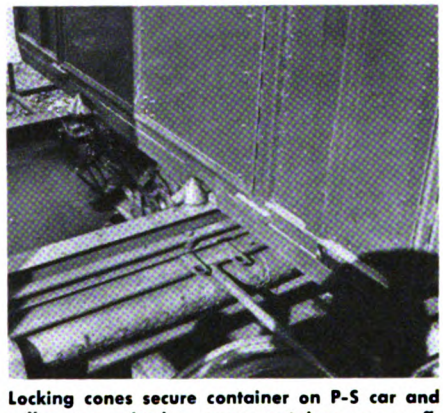


Sixteen side-loaded Trailmobile containers can be carried on Pullman-Standard skeleton container car designed for passenger-train service.

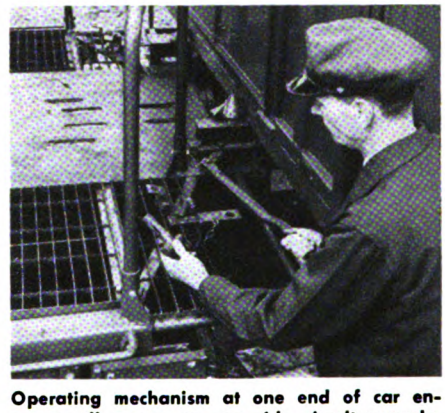
ack-cradle loaded with five containers an be end-loaded on the car from a at-bed truck, utilizing the components of the Clejan system developed for handling 20-ft and 40-ft containers. Hinged extensions of the ransverse channels serve as container ops when raised, and, when lowered, ct as bridges to the platform truck or) a platform. It is possible for the ar to carry one or more rack-cradles nd other types of containers simulneously.

The 212-cu ft Fruehauf magnesium ontainer has a width of 7 ft 10⅜ in., height of 8 ft 2¾ in., and a length f 3 ft 8¾ in. It has a light weight of 96 lb and a 4,000-lb capacity. There re 41-in. by 83-in. double-swing oors in one side and one end, fitted ith piano-type hinges and rubber askets. The container has a magesium 0.125-in. tread-plate floor. ides are 0.156-in. magnesium. Lifting rings, fork-lift plates, and tow ars are standard.

The 50-ton capacity, 87-ft skeleton-ype Pullman-Standard car, equipped or passenger service, has a stationary ontainer rack consisting of two I-eams running the length of the car top the center sill. Top of the center ll is 41½ in. above the rail. The two -in. I-beams are 39½ in. apart. Steel ones with wing tips placed at 5-ft inervals on these beams secure the containers. After disengaging a safety latch, a lever is shifted to unlock all the hold-down cones on one beam simultaneously. The process is then repeated to disengage cones along the opposite beam.



Locking cones secure container on P-S car and rollers are raised to move container on or off.



Operating mechanism at one end of car engages all cones on one side simultaneously.

Transfer of the 5-ft containers to and from the REA hydraulic variable-height platform truck is accomplished by the raising steel rollers on the P-S car and winching the container on to similar rollers on the edges of the platform truck. After roller wheels on the car are raised by chains, which are attached to their elevating mechanism from the platform truck, a link-chain pulley system makes it possible to move containers.

This "all-container" car is built not only to handle the smallest 5-ft containers, but can carry others in 10-ft modular lengths up to 40 ft. A variety of different sizes can be carried simultaneously.

The Trailmobile containers are made of 16-gage steel with exposed integral posts. They are 4 ft 10¼ in. long, 8 ft wide, and 8 ft high. Each container weighs 1,450 lb and has a payload limit of 4,550 lb. In the two ends and one side are 51-in. by 87-in. door openings, each having rubber-sealed, piano-hinged, double-swing doors. Floors are ¾-in. oak.

Light weight of the P-S car is 45,900 lb, and sixteen loaded containers weigh 96,000 lb. Tests at the P-S research laboratory in Hammond, Ind., have shown that the cone-type hold-downs on an uncushioned cradle comprise "an arrangement completely adequate for passenger-train service."

(Continued from page 5)

Equipment Orders

Orders for new freight cars placed during March totaled 1,796 as compared with 1,536 for February 1961. March 1960 orders totaled 1,957. On April 1 there were 15,801 cars on order and undelivered. This compares with 18,429 cars on order and undelivered on March 1, and 42,131 on April 1, 1960. Additional orders and programs announced since the closing of the April issue follow.

The *Canadian Pacific* plans to spend $17,761,345 in 1961 for new equipment, including 1,300 box cars and 100 covered hopper cars. 300 50-ton steel-sheathed, wood-lined box cars have been ordered from Dosco Trenton Works, Trenton, N.S. These insulated cars to be 41½-ft, 3,350 cu ft capacity, for heated service during winter months.

Completion of *Chicago & North Western* modernization of suburban passenger service in 1961 will include delivery of the last 68 of 116 double-deck cars ordered from Pullman-Standard; conversion of 48 1955-56 double-deckers for push-pull operation ($2 million), and installation of auxiliary equipment in 25 locomotives to be used in push-pull service ($1.1 million).

The *Delaware & Hudson* will spend $13,700,000 during 1961 for maintenance work—of this, $8,700,000 for maintenance of equipment. This is in addition to an appropriation of $3,400,000 for capital expenditures for additions and betterments to road and equipment, including purchase of 6 new and 6 completely rebuilt diesel locomotives. Maintenance of equipment program includes heavy overhaul of 28 diesel locomotives, repainting 70 locomotives in new D&H colors, heavy repairs to 450 freight cars, and repainting 1,500 freight cars in new Oneonta, N. Y., paint shop. In making this announcement, J. P. Hiltz, Jr., vice-president in charge of operation and maintenance, said that, if business conditions warrant and demand for freight cars increases, maintenance of equipment program and expenditures will be increased accordingly.

The *Denver & Rio Grande Western* has ordered 150 70-ton covered hoppers from Greenville Steel Car Co. for July delivery.

The *Frisco* is currently running tests on the 119-ft Auto-Porter, the bi-level, articulated auto car developed in Germany and recently exhibited in the U. S. by North American Car.

The *Great Northern* has ordered 10 40-ton steel cabooses from International Car, for delivery this month, and 50 50-ton box cars from Pacific Car & Foundry, for August delivery.

The *Gulf, Mobile & Ohio* has received delivery of 45 50-ft box cars from American Car & Foundry Div. at a cost of about $5,000,000.

Maine Central equipment modernization program calls for the purchase of "at least 200 50-ft box cars each year for four and, perhaps, five years," all to be equipped with roller bearings and special loading devices; purchase of additional piggyback cars; conversion of gondolas for limerock service, and acquisition of 20 bulkhead type sideless pulpwood rack cars. President E. Spencer Miller has said program depends upon whether the Maine legislature acts to reform Maine's present gross receipt tax on railroads.

The *Milwaukee* will acquire six remanufactured 2,400-hp diesel-electric passenger units.

The *Missouri Pacific* has ordered 500 roller-bearing box cars from Pullman-Standard, at a cost of $5,000,000, for June-July delivery.

The *New Haven* has placed in service the first of 100 refurbished passenger coaches. Renovated cars are being put into service at a rate of two per week. Meanwhile, NH stockholders have approved acquisition of 100 new commuter coaches (RL&C, April 1961, p 8). Fifty will be leased for a 25-yr term from the Port of New York Authority, the remainder purchased under private financing.

The *New York Central* has ordered 30 new 2,000-hp general-purpose diesel-electric locomotives at a cost of $5,360,000—15 from EMD and 15 from Alco. Deliveries to begin in June. The road is also converting ten roomette cars, designed for 22 first-class passengers, into 36-passenger "Sleeper—coaches." The work is being done at Budd's Red Lion Plant at a cost of roughly $100,000 per car.

Relief measures for New York State commutor railroads passed by the state legislature have now become law, with the signature of Governor Rockefeller. The *New York Central, New Haven,* and *Long Island Railroad* get $8 million in tax relief and will, in turn, order 230 new commuter cars—100 for the NH, 65 for the LIRR, and 65 previously announced for the NYC.

North American Car and the *New York Central* are testing General Motors Diesel Ltd's new Portager, a 44-ft four-wheel flat adaptable either for trailers or containers.

The *Santa Fe* equipment acquisition program for 1961 will include 25 baggage cars, in addition to 1,755 freight cars previously reported by the road. $37.9 million of total capital improvements budget for the year (approximately $65 million) will be spent for equipment. 60 2,600-cu ft capacity Airslide covered hopper cars have been ordered from General American—25 for immediate delivery; the remaining 35 for delivery beginning in October.

The first diesel-hydraulic locomotive for service in the U.S. has been completed by Krauss-Maffei in West Germany, and tests are now under way on the German Federal Railways. The unit is one of six being built for *Southern Pacific* and *Denver & Rio Grande Western.* Delivery of all the units is scheduled for early next fall, according to reports from German sources.

The *Texas & Pacific* has ordered 35 70-ton insulated box cars from Pullman-Standard at a cost of $705,000, for May-June delivery.

Trailer Train has ordered 293 king-size flat cars for hauling highway trailers and new automobiles and will order 207 more in the near future. Cost for all 500 cars will be over $7 million. Cars on order will be of two-trailer capacity and have roller bearings and other features for high-speed service. ACF will build 100; Bethlehem Steel, 60; GATC, 25, and Pullman-Standard, 108.

The *Union Pacific* has purchased 65 70-ton, roller-bearing-equipped covered hoppers from Pullman-Standard.

The *U. S. Government* has ordered 2[illegible] 100-ton helium cars from ACF at a co[illegible] of $2,300,690.

GM Charged With Anti-Trust Violation

General Motors Corp. has been indicted [illegible] a federal grand jury in New York o[illegible] charges of using its economic power i[illegible] legally to monopolize manufacture and sa[illegible] of locomotives. From 47.1% in 1946, th[illegible] indictment asserted, GM increased its sha[illegible] of the business to 84.1% last year. Mea[illegible] while, Alco dropped from 39.7% to 13.1% and Fairbanks, Morse & Co., and Baldwin-Lima-Hamilton Corp. were driven fro[illegible] the market. Another allegation was th[illegible] General Electric has not yet sold a [high-horsepower domestic] diesel locomotive, a[illegible] though a year ago it announced its entr[illegible] into this field.

"General Motors is not guilty of the mo[illegible] opolistic practices charged in the indic[illegible] ment," GM Chairman F. G. Donner com[illegible] mented following the grand jury actio[illegible] "This will be clearly established at th[illegible] trial. General Motors is proud to stand o[illegible] its record in the development, productio[illegible] and sale of diesel electric locomotives which demonstrates a major contribution [illegible] the railroad industry and to the transport[illegible] tion economy."

The federal indictment, which charge[illegible] GM with violating Section 2 of the She[illegible] man Antitrust Act, listed ways in which GM allegedly forced railroads to buy locom[illegible] tives built by its Electro-Motive Divisio[illegible] The list, as summarized in Attorney Ge[illegible] eral R. F. Kennedy's announcement, in[illegible] cluded:

- Routing rail shipments to favor pu[illegible] chasers of GM locomotives and withhol[illegible] ing or reducing shipments from lines whic[illegible] purchased locomotives from GM compe[illegible] tors (The indictment said GM is possibl[illegible] the country's largest shipper.)
- Building GM facilities near lines o[illegible] railroads to persuade those roads to pu[illegible] chase GM locomotives.
- Financing sale or lease of locomotive[illegible] on terms its competitors could not matc[illegible]
- Participating in formulation of locomo[illegible] tive specifications for use in obtaining com[illegible] petitor bids which prevented other man[illegible] facturers from competing.
- Selling locomotives at a loss in se[illegible] ments of the market where it had compet[illegible] tion.

Along with the denial of guilt, Mr. Do[illegible] ner stated. "It is difficult to understan[illegible] why after so many years of business oper[illegible] tion by General Motors in this field, wit[illegible] so much data and information known t[illegible] and available to the government, it should now file this proceeding.

"Commencing in 1956, and for a perio[illegible] of months, General Motors made available (to the Department of Justice) documents statistical data and files relating to its diese[illegible] electric locomotive business. In 1955, rep[illegible] resentatives of General Motors and others testified in detail before the sub-committee on antitrust and monopoly of the Committee on the Judiciary, United States Sen[illegible]

:e, covering the history and business ac-vities of General Motors' locomotive bus-ness from 1936 through the first nine onths of 1955.

"For years, General Motors has been the ader in this field. This was inevitable, nsidering that it was the innovator and er the years has concentrated on the de-lopment and improvement of the diesel, hile competitive manufacturers were still omoting the sale of steam locomotives.

"The success of General Motors in this nture has not been a secret . . . That eneral Motors' leadership in the locomo-ve field has not been the result of any onopolistic practices is evidenced by the claim of our customers, the railroads, who rtainly know best why they bought our oducts. Contrary to the charges, the pur-asers of locomotives and the public have rived great benefits from General Mo-rs' leadership in this field."

.etters to the Editor

oo Many Charges?

O THE EDITOR:

The economic recession is, we hope, nly a temporary situation. The railroad idustry, however, has been in an economic cession for more than a dozen years. Dur-ig this period, railroads have suffered a ntinuous loss of business and revenue. bviously, there is a clear need to cut ex-enses.

It is, and has been, the practice of rail-oads over the years to repair foreign-line ars in interchange when such repairs are ecessary and, through a central account-ig system, to bill the car owners for such epairs. Very often railroad managements ake the mistake of assuming that they are aving money by issuing as many billing epair cards as possible to offset the costs f repairs made to their own cars by other ailroads. Railroad car repair shops and epair tracks are usually operated quite fficiently. The repairs and subsequent bill-ig are perfectly legitimate.

But what about the train yards? Don't ealous car inspectors replace many brake hoes and air hoses that have not yet eached condemning limits only to make as any repairs as possible? Haven't many ar inspectors replaced the first convenient ournal-box lid or brake shoe key just to make a showing" for the day?

Consider one shoe, one box lid, one hose, r one shoe key applied improperly by one ar inspector and multiply this by thou-ands of car inspectors. This is an un-arranted burden on the financial struc-ure of the railroad industry.

Rule 108 of the AAR car interchange ules should be modified so there would be o labor or material charges allowed for enewal of brake shoes, shoe keys, journal-ox lids, and air hose when this work is one in the train yard. Charge should be llowed, however, for these repairs while car is in a car repair shop or on a repair rack.

This innovation could eliminate waste, nd offer savings to the railroad industry at arge and to private car-line owners.

A Reader

Personal Mention

Baltimore & Ohio.—*Baltimore, Md.:*—Title changes—F. H. EINWAECHTER, chief engineer motive power and equipment, now chief engineer motive power. W. A. MULLEN, superintendent mechanical methods and procedures, now superintendent mechanical methods.



W. D. Dickie

Canadian Pacific.—*Montreal:* W. D. DICKIE, assistant chief of motive power and rolling stock, appointed chief of motive power and rolling stock, succeeding LEO B. GEORGE, retired.

Mr. Dickie entered Glen Yard shops in Westmount as a machinist apprentice in October 1915. Subsequently became machinist at Winnipeg; draftsman and shop engineer; chief draftsman; general foreman at Moose Jaw, Sask.; division master mechanic at Calgary; assistant to the chief of motive powers in Montreal; assistant works manager, and works manager, Angus shops. Became assistant chief of motive power in August 1957.

Canadian National.—ATLANTIC REGION: H. H. HICKS appointed superal superintendent equipment, *Moncton, N.B.* MOUNTAIN REGION, *Edmonton Area:* A. MACIVER appointed superintendent equipment; F. C. FRASER, assistant superintendent equipment, and C. RUDOLPH, road foreman of engines. *Calgary Area:* R. B. GILCHRIST appointed superintendent equipment, Calgary. *Hudson Bay Area:* BERNARD GASIOR appointed superintendent equipment, Dauphin, Man. *British Columbia Area:* R. M. COWAN appointed superintendent equipment, and F. F. GRAY, assistant superintendent equipment, Vancouver. PRAIRIE REGION, *Winnipeg Area:* H. A. MCDONALD appointed assistant superintendent equipment, Winnipeg. *Assiniboine Area:* S. A. PAYNE appointed superintendent equipment, Winnipeg.

Chesapeake & Ohio.—*Richmond, Va.:* R. E. CARTWRIGHT appointed electrical inspector. *Huntington, W. Va.:* B. L. STEVENS appointed assistant engineer, succeeding Mr. Cartwright.

Elgin, Joliet & Western.—*Joliet, Ill.:* CLETUS G. MAHONEY, superintendent of motive power, assuming direct supervision of locomotive department. WILLIAM J. MCGAHEY

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appointed diesel shop foreman (nights). CLYDE M. YAHNKE appointed erecting foreman—light repairs. FREDERICK C. PIERCE, JR., appointed erecting foreman—heavy repairs. *Waukegon, Ill.:* BERT J. REGAN appointed general mechanical foreman, with supervision over locomotive and car department.

Florida East Coast.—*New Smyrna Beach, Fla.:* JOHN SIMS appointed shop superintendent, locomotive department.

Gulf, Colorado & Santa Fe.—*Cleburne, Tex.:* D. J. EVERETT appointed superintendent of shops—master mechanic, Northern division, succeeding J. D. NIMMO, retired. Mr. Everett formerly superintendent of shops—master mechanic, Western Lines, Santa Fe, Albuquerque, N.M. C. W. CRAMER, general foreman—diesel, appointed assistant superintendent of shops—locomotive. O. H. BARKER, JR., superintendent car department, appointed assistant superintendent of shops—car.

ICC, Bureau of Safety and Service.—*Pittsburgh, Pa.:* GEORGE L. HENDERSON, inspector of locomotives, Section of Locomotive Inspection, retired.

Louisville & Nashville.—*Louisville, Ky.:* WILLIAM C. ROLLINGS appointed assistant manager—planning-production, chief mechanical officer's office. *South Louisville, Ky.:* RUFUS J. MAY, assistant shop superintendent, appointed shop superintendent, succeeding Mr. Rollings.

New York Central.—*New York:* P. R. OLIVER appointed general supervisor car maintenance. W. L. O'CONNOR appointed general supervisor locomotive maintenance. E. L. HYATT appointed supervisor of safety and training—mechanical. *Collinwood, Ohio:* J. J. GREGORY appointed supervisor of cost control. R. A. JOHNSON appointed process engineer.

Santa Fe.—*Albuquerque, N.M.:* D. L. QUINEY appointed assistant master mechanic, New Mexico division.

Southern.—*Knoxville, Tenn.:* HAROLD K. MADDOX appointed road foreman of engines.

Terminal Railroad Assn. of St. Louis.—*St. Louis, Mo.:* H. G. FIELD appointed superintendent motive power and equipment, succeeding GEORGE B. MILLER, retired. FRED C. WHITLOCK, assistant to superintendent motive power and equipment, retired.

Texas & New Orleans.—*Houston, Tex.:* P. B. RICE appointed master mechanic, Lafayette and Houston divisions. *San Antonio, Tex.:* E. I. NORMAN named master mechanic, San Antonio and Dallas and Austin Divisions.

OBITUARIES

John J. Tatum, 94, who retired in 1942 as assistant chief of motive power and equipment of the Baltimore & Ohio, died in Baltimore on March 28.

Harry C. Oviatt, 89, retired general mechanical superintendent, New Haven, died March 10 in Ridgefield, Conn.

Supply Trade Notes

AILWAY SERVICE & SUPPLY CORP. -*T. C. Coleman & Son,* Louisville, Ky., ıd the *O. K. Co.,* Chicago, appointed dis-ibutors in respective areas for condition-ly approved Utility and Optimum lubri-ıtors.

■

USTIN - BACON MANUFACTURING O.—*Thomas N. Collins* and *W. F. Bar-olomae, Jr.,* appointed representatives, hicago railroad sales department.

■

OULD-NATIONAL BATTERIES, INC.; URE OIL CO.—*Gould-National* and *Pure il* have signed a contract for a joint re-arch program on fuel cells and fuels. Pro-am under direction of Dr. Royce E. Bid-ck of Gould-National research staff.

■

ALDWIN-LIMA-HAMILTON CORP.— *onald Lade,* assistant general sales man-ger, named general sales manager of *andard Steel Works,* division of BLH, at ırnham, Pa.

■

ENERAL ELECTRIC CO.—*Charles F. ırney* appointed manager of railroad sales, tional accounts department. *Robert M. ıultas,* manager of transportation sales, ıst Central Region, named manager of mestic locomotive sales.

■

ALL-TOLEDO, INC.—*Donald J. Leon-d* appointed Michigan representative.

■

ECTRO-MOTIVE DIV., GENERAL MO-RS.—*Frank J. Chambers* appointed as-tant manager, parts supply, succeeding *A. Warren,* retired.

■

NATONNA TOOL CO.—*S. L. Rich-ınd* appointed sales manager, Tools and uipment Div. *Gordon F. Packer,* Orange, lif., named district sales representative Southern California and Arizona, and *lph W. Long,* Arcadia, Calif., sales repre-ıtative for Central California and Clark ., Nevada, OTC Tools & Equipment Div.

■

MINGTON WAYNE CORP.—*Robert Messimer,* sales engineer at New York, pointed district sales manager, Syming-ı Div., at Chicago.

■

-CELL-O CORP. — *Ex-Cell-O Machin-Sales* established at 12200 S. Bellflower vd., Downey, Calif., to handle factory es and service not only of Ex-Cell-O ıchine tools, but also those of Bryant ucking Grinder Co. and Michigan Tool ., subsidiaries of Ex-Cell-O, in Southern lifornia area. *Howard H. Schrock* is trict manager.

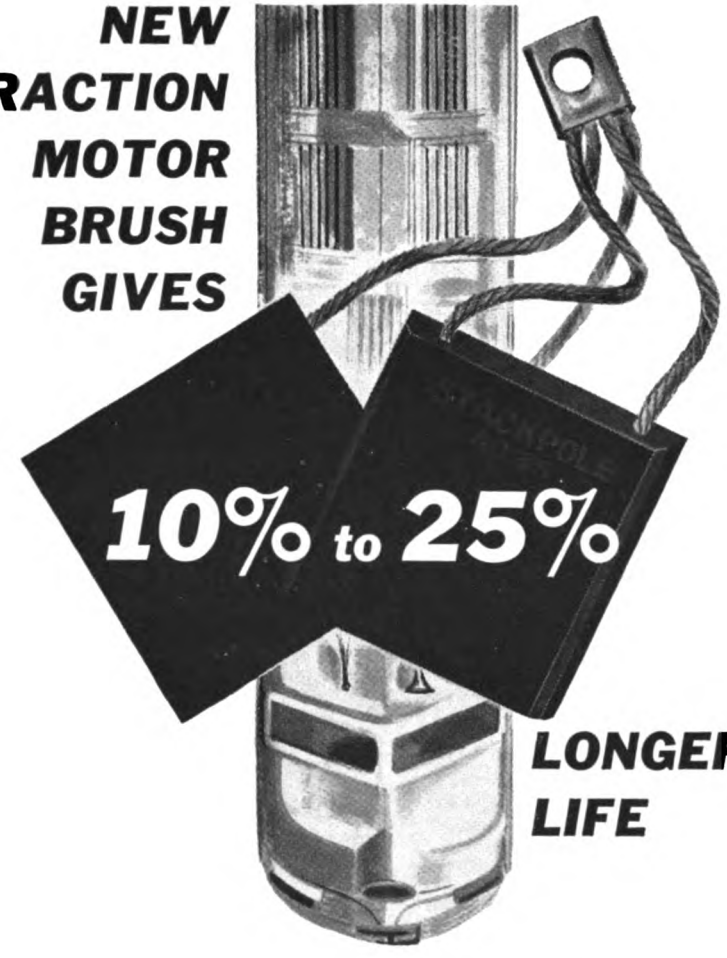
■

ECTRIC STORAGE BATTERY CO.— *nes A. Mustard, Jr.,* general sales man-er, Nickel-Alkaline Battery Division, pro-ıted to assistant to vice-president—mar-ing, Industrial Marketing Division, at iladelphia, Pa.

OBITUARIES

ANK S. CARLILE, co-founder of C & D tteries, died suddenly on March 30 after fering a heart attack in Valpariso, Chile.

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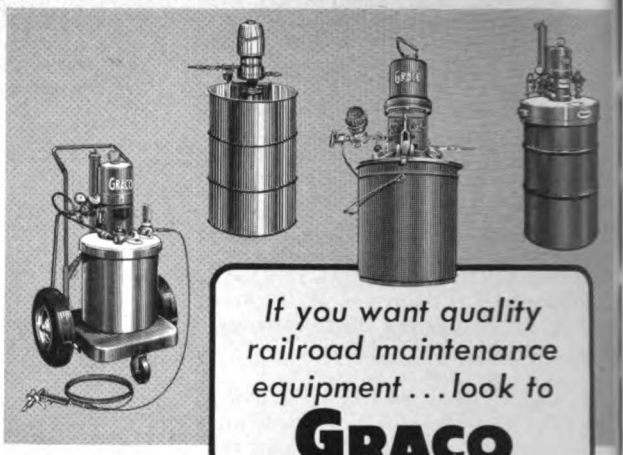
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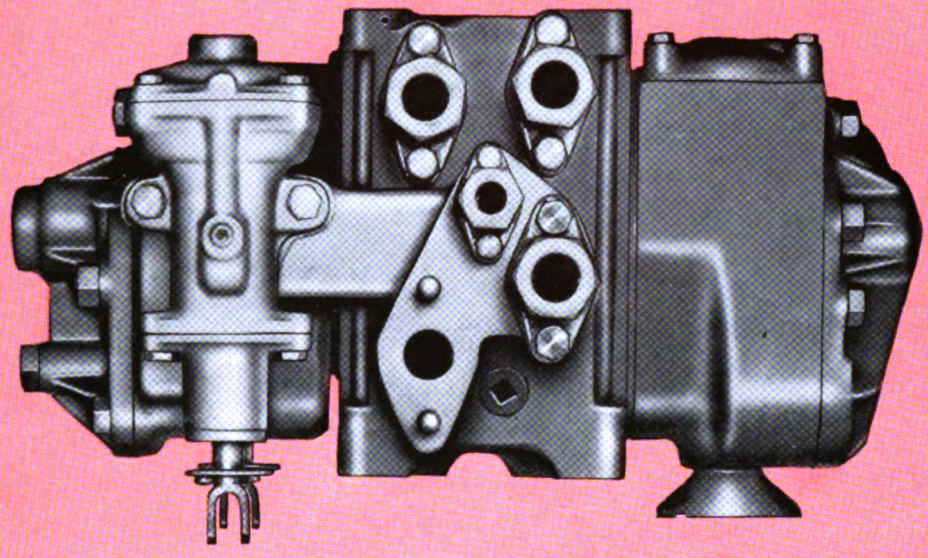
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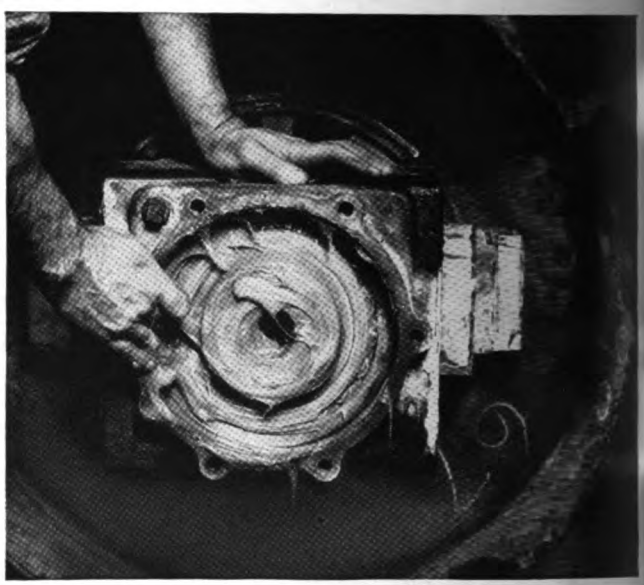
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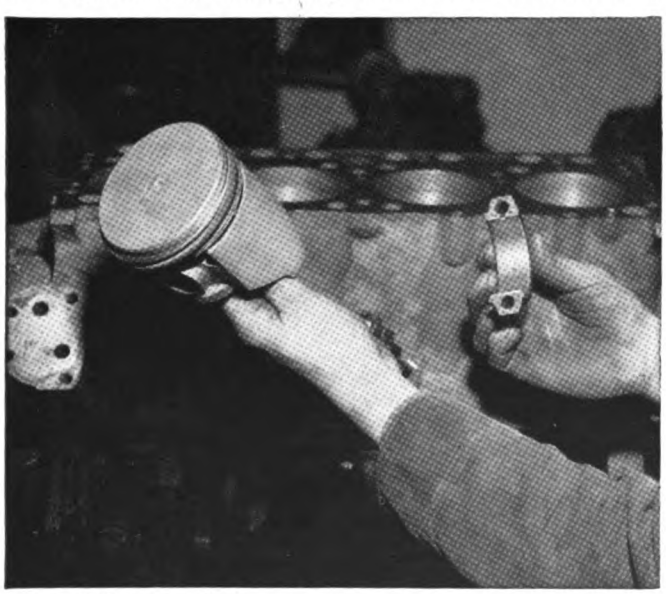
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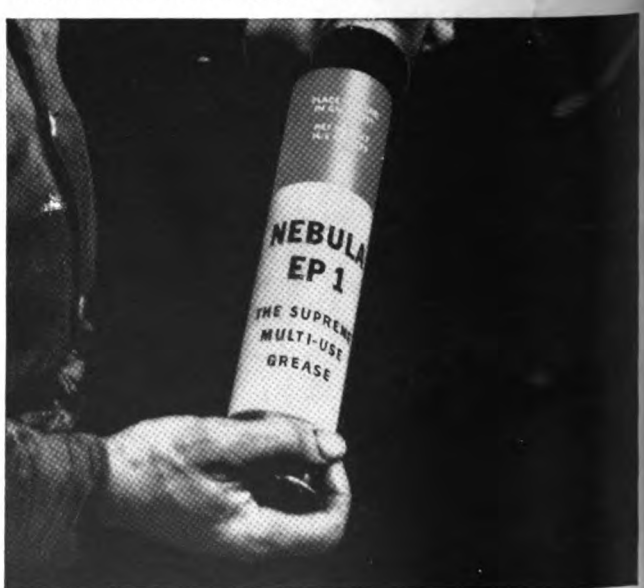
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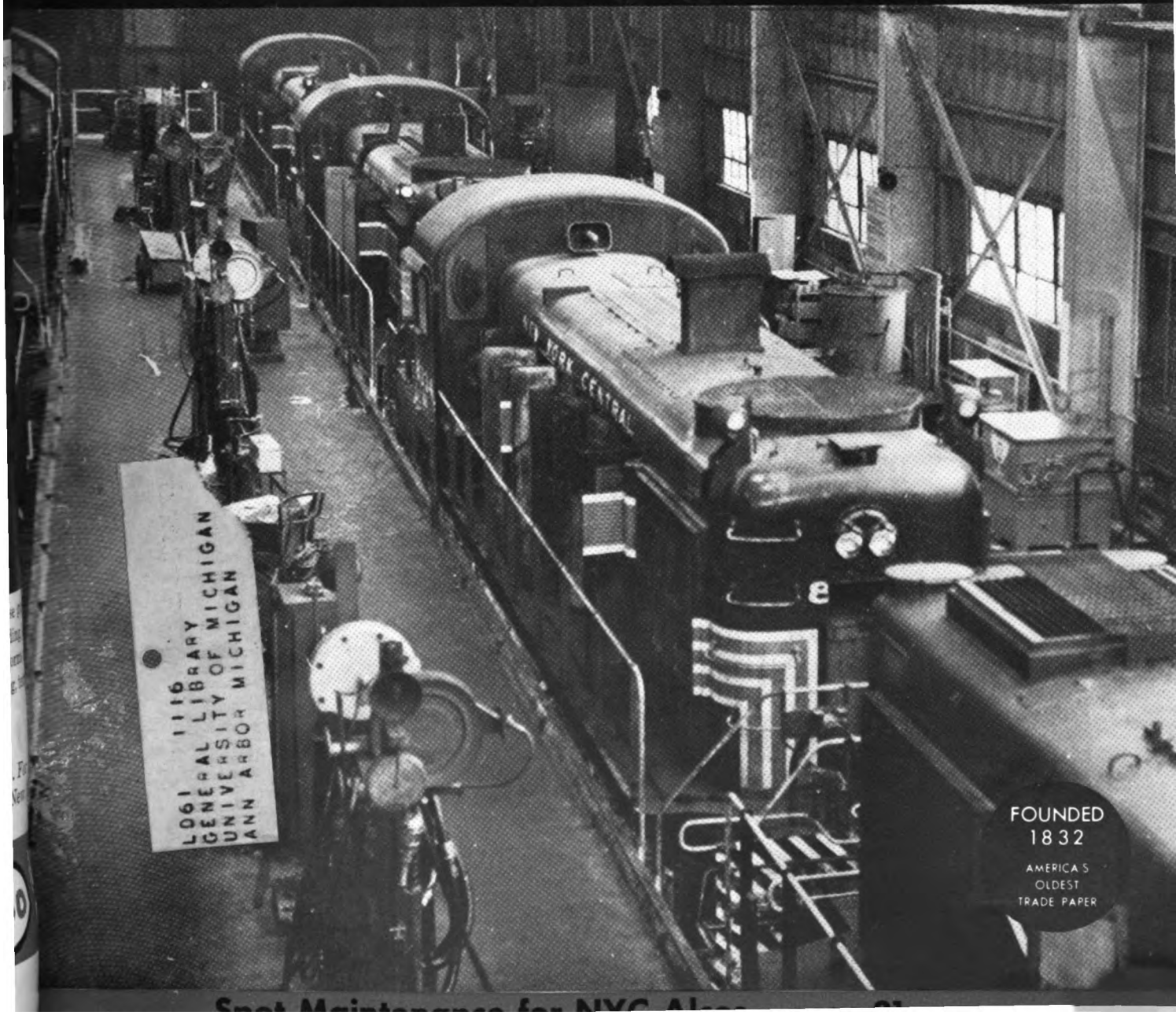
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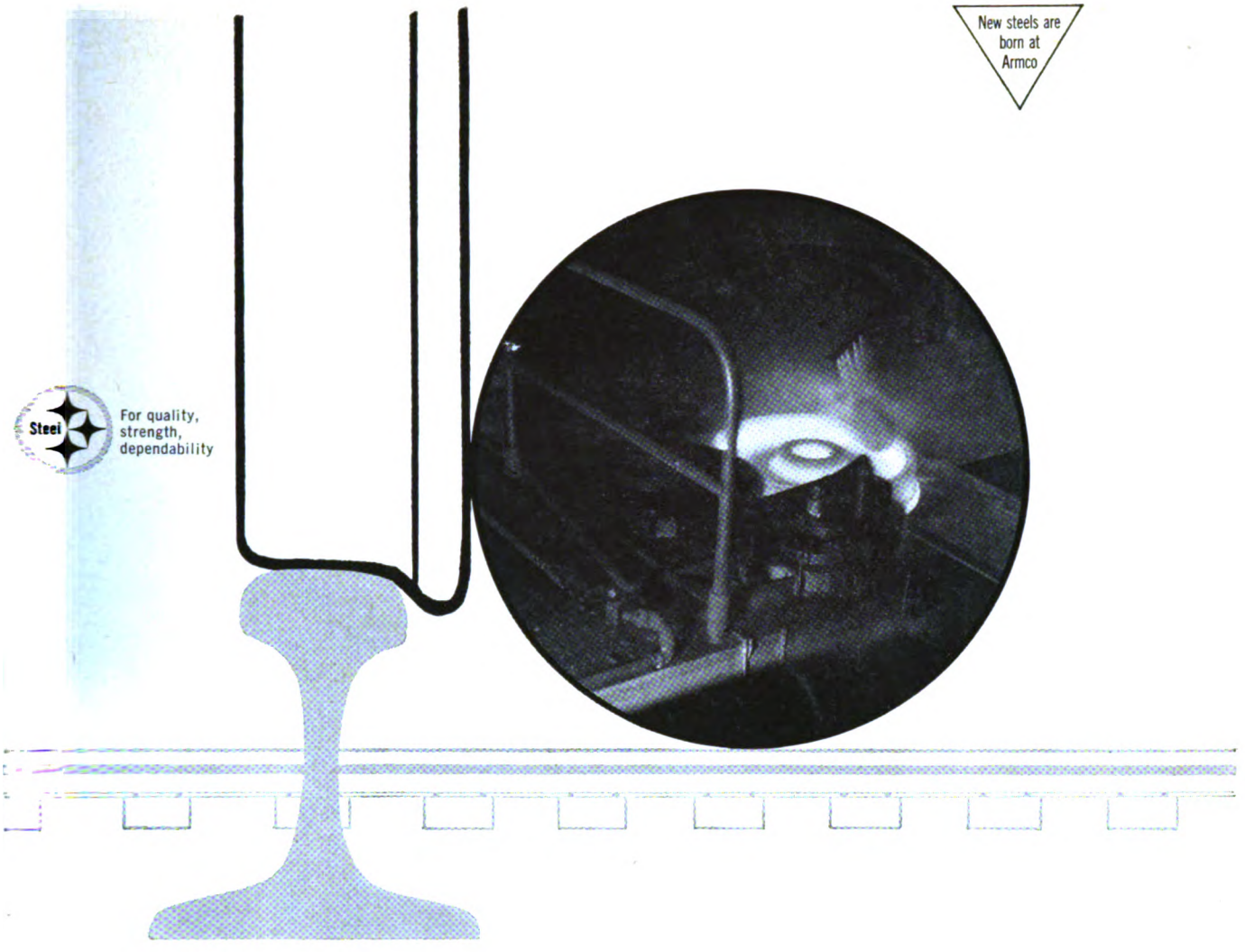


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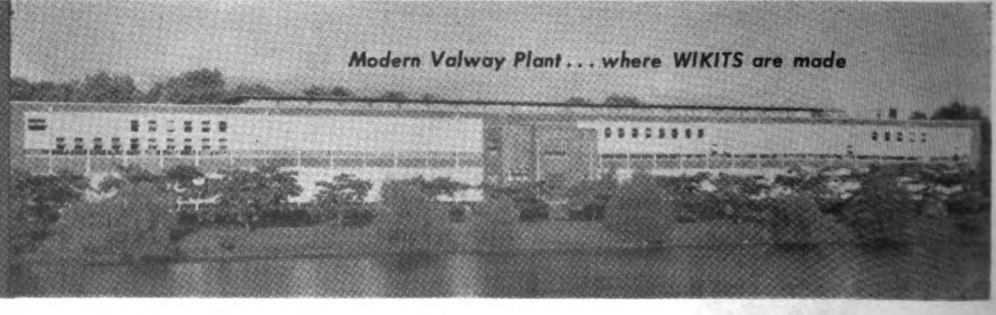
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REPORT FOR JUNE

Coordinated Mechanical Associations Meetings

Equipment displays on approximately a mile of track and a large indoor exhibit at the Hotel Sherman will be features of the September 1961 meetings of the Coordinated Mechanical Associations in Chicago. The separate meetings of the four groups—Air Brake, Car Department Officers, Locomotive Maintenance Officers, and Railway Fuel and Operating Officers Associations—will be held simultaneously at the Hotel Sherman from Monday, September 11, through Wednesday, September 13.

The equipment exhibits of the Allied Railway Supply Association will be held in the Exhibition Hall of the Sherman and at the 31st Street Yard of the Illinois Central along Chicago's lake front. Allied will operate buses from the hotel to the outdoor exhibit area.

L. P. Gangewere, president, Reading Co., will be the speaker at the luncheon honoring all railroad presidents to be held on Tuesday, September 12, in connection with the Coordinated meetings, the programs for which follow.

Air Brake Association

MONDAY, SEPTEMBER 11. *Address:* E. P. Gangewere, president, Reading Co. *Papers:* Air Brake Suppression of Locomotive Accelerated Slips—Ralph C. Ross, project engineer, New York Air Brake Co.; Techniques of Air Brake Maintenance—Pittsburgh Air Brake Club; Train Yard Air Brake Problems and Their Remedies—St. Louis Air Brake Club; Air Compressor Lubrication—K. Reyea, research and development engineer, Texaco Inc.; Wabcopac Brake Units—Westinghouse Air Brake Co.; Metropolitan Commuter Train Brake Equipment—Manhattan Air Brake Club.

TUESDAY, SEPTEMBER 12. Joint meeting with Locomotive Maintenance Officers Association. *Papers:* Tons per Operative Brake—Central Air Brake Club; Methods of Dynamic Interlock Application — H. MacPherson, supervisor air brakes, Canadian Pacific; Methods and Materials in Air Brake Pipe Joints—Dresser Manufacturing Div., Dresser Industries.

WEDNESDAY, SEPTEMBER 13. *Papers:* Automatic Train Operation—Montreal Air Brake Club; Vigilance and Safety Control—D. A. Wagner, air brake instructor, Baltimore & Ohio.

Car Department Officers

MONDAY, SEPTEMBER 11. *Address:* Spencer D. Moseley, president, General American Transportation Corp. *Committee reports:* AAR Loading Rules; Road-Rail Transportation; Interchange and Billing for Repairs to Cars and TOFC Trailers; Design, Maintenance and Upgrading Freight Car Equipment.

TUESDAY, SEPTEMBER 12. *Committee reports:* Light Repair Tracks and Train Yard Operation; Car Lubrication, with comments by W. M. Keller, vice-president (research), AAR.

WEDNESDAY, SEPTEMBER 13. *Committee reports:* Wheels, Axles, and Wheel Shop Practices, with film on Southern's automated wheel shop; Passenger Car Maintenance; Maintenance and Servicing of Mechanical Refrigerator Cars and TOFC Trailers; Painting.

A question and answer session on Rules of Interchange, Loading Rules, and other topics not covered in any of the committee

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reports, will again be held this year. This feature was instituted at last year's meeting.

Locomotive Maintenance Officers

MONDAY, SEPTEMBER 11. *Address:* C. N. Wiggins, Jr., assistant general manager, Louisville & Nashville. *Committee reports:* Diesel Engine Maintenance—Topic: New Economical Methods That Improve Service Life of Diesel Engines. Steam Generator and Water Treatment—Topic 1: New Simplified Control for Steam Generators; Topic 2: Steam Generator Rifled-Tube Performance. Shop Equipment—Topic: Modern Equipment and Methods for "Spot" Maintenance and Inspection of Locomotives.

TUESDAY, SEPTEMBER 12. *Address:* Edwin Butler, assistant director of locomotive inspection, Bureau Safety & Service, ICC. *Committee reports:* Diesel Mechanical Maintenance—Topic: Effect of New Type Brake Shoes on Locomotive Maintenance and Operation. Diesel Material Reconditioning and Control—Topic: Latest Practices in Economical Reclamation of Locomotive Parts.

WEDNESDAY, SEPTEMBER 13. *Committee reports:* Diesel Electrical Maintenance—Topic 1: New Ideas in Maintenance and Rebuilding of Traction Motors and Main Generators; Topic 2: Upgrading Control Equipment. Fuel and Lube Oil—Topic 1: Lube and Fuel Oil Filtration; Topic 2: Engine Sparking. New Developments in Motive Power Maintenance—Topic: mechanical department production control systems, or other recent developments in motive power maintenance.

Fuel and Operating Officers

MONDAY, SEPTEMBER 11. *Addresses:* J. C. Kenefick, general manager transportation, New York Central; P. C. White, director of supervisory training, Frisco. *Paper:* Safety—E. H. Hallmann, director of personnel, Illinois Central. *Panel discussions:* Loss and Damage Prevention, R. G. Norton (chairman), Norfolk & Western; Train Handling—G. Billingsley (chairman), general road foreman of engines, Missouri Pacific; Instructions on Handling of Trains with 24RL and 26 L Brakes—M. A. Davis (chairman), chief road foreman, Delaware & Hudson.

TUESDAY, SEPTEMBER 12. *Papers:* Duties and Responsibilities of Road Foreman—J. S. Swan, supervisor motive power utilization, Louisville & Nashville; Economical Utilization of Power—C. M. Machin, manager motive power operation, Baltimore & Ohio; New Electric Motive Power E-44—J. S. Lotz, assistant road foreman, Pennsylvania. *Panel discussions:* Economy in Use of Fuel Oil—A. H. Glass, chief power and fuel supervisor, Chesapeake & Ohio, and L. P. Parker, Gulf, Mobile and Ohio; Terminal Delays and Yard Operation—N. C. Sweetin (chairman), road foreman of equipment, Frisco.

WEDNESDAY, SEPTEMBER 13. *Paper:* EMD Advances Horsepower. *Panel discussion:* Diesel Failures, Causes and Remedies—D. J. McGillivray (chairman), Canadian National.

Lanterman Predicts Increase in Car Building

A total of 37,500 freight cars will be built in 1961, is the prediction of Joseph B. Lanterman, president, American Steel Foundries. Mr. Lanterman told New York security analysts that, by December, production should be at a rate of about 60,000 per year.

Since this prediction by Mr. Lanterman, Central of Georgia president W. E. Dillard has expressed fear that a "serious" shortage of freight cars may develop within 12 months as business continues to turn upward, and thinks that "those that possibly can see their way clear" should place orders now in order to be ready for rising shipper demands. To prevent a shortage on his own line, Mr. Dillard is augmenting the road's present fleet of 549 hoppers with the order for 75 covered hoppers listed below.

The *Burlington* includes in its 1961 freight-car program 250 70-ton insulated box cars with special loading devices. Cars to be built in company shops and completed for third quarter delivery.

The *Canadian Pacific* has ordered 450 box cars from Canadian Car and 700 from National Steel Car. Cars will be 50-ton, 41 ft 10 in. long, and have a capacity of 3,900 cu ft.

The *Central of Georgia* has ordered 75 roller-bearing covered hopper cars from Pullman-Standard at a cost of $1,011,900. Delivery now under way.

The *Great Northern* has ordered 2(2,600-cu ft Airslide covered hopper cars from General American for autumn delivery. 500 50-ft, 50-ton box cars being constructed in St. Cloud, Minn., shops. Cars to be equipped with roller-bearing trucks and combination 8-ft plug and 6-ft sliding doors. Plans also being made to rebuild 600 existing 40-ft box cars.

The *Maine Central* has ordered 200 50-ft box cars from Pullman-Standard at a cost of over $2,000,000. Cars being equipped with 9-ft aluminum doors, specially designed draft gear, and roller bearings. Delivery to begin this month.

The *Metropolitan Transit Authority* (Boston, Mass.) will soon request bids for an estimated 90 new subway cars. Fleet to replace existing rolling stock on Boston's Cambridge-Dorchester subway line.

The *New York Central* is completing specifications for 500 box cars to be built at its Despatch shops.

The *Norfolk Southern* has purchased 5 70-ton, 3,500-cu ft covered hoppers from American Car & Foundry at a cost of $11,700 each.

North American Car has begun delivery of 80 40-ft refrigerator cars to John Morrell & Co. An additional 100 cars will be built for Morrell during the third quarter of this year.

The *Northern Pacific* has authorized construction, in company shops, of 350 50½-ft box cars with 15-ft double doors, nailable steel flooring, and 50-ton roller-bearing trucks. Construction to start during fourth quarter. Order replaces 159 50-ft box cars and 200 40-ft box cars previously reported (RL&C, Dec. 1960, p 8).

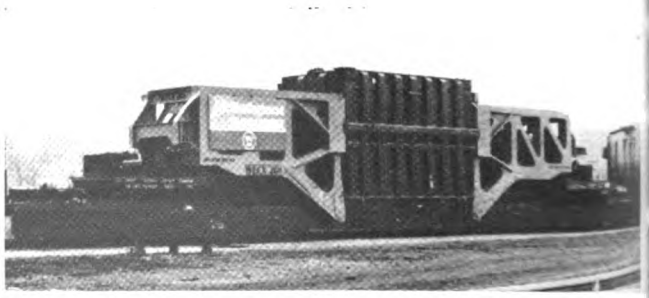
The *Passenger Service Improvement Corp.* of Philadelphia is asking bids for 2(air-conditioned, stainless-steel cars to be used in city-sponsored program. Cars to cost approximately $5,000,000. Each will accommodate 125 passengers.

The *Port of New York Authority* is expected to announce soon details of purchase of new commuter cars for lease to the New York Central, New Haven, and Long Island.

(Continued on page 46)



Pneumatically operated tank-type car with a capacity of 2,400 cu ft handles materials normally moved in covered hoppers. Developed by the Halliburton Co. of Duncan, Okla., for moving materials used in oil well cementing, the car has now been operated experimentally handling other granular and pelletized products. The special 70-ton car was built by Thrall. It is fitted with three standard Halliburton tear-drop shipped, 8,000-cu ft tanks piped for pneumatic loading and unloading. Load limit is 152,000 lb.



Two-section transformer car recently acquired by Westinghouse Electric Corp. has a capacity of 750,000 lb. The transformer becomes an integral part of the car structure and is nearly 5 in. above the rail. The car has two 6-wheel and two 4-wheel trucks. When moving unloaded, the two portions of the car are joined together, forming a unit 78 ft 6 in. long. This is the second of the type put into service by Westinghouse handling units produced by its Sharon, Pa., Transformer Division. The capacity of the first is 500,000 lb.



Machine operator, wheel shop foreman and Kennametal carbide engineer study ways to cut tooling costs.

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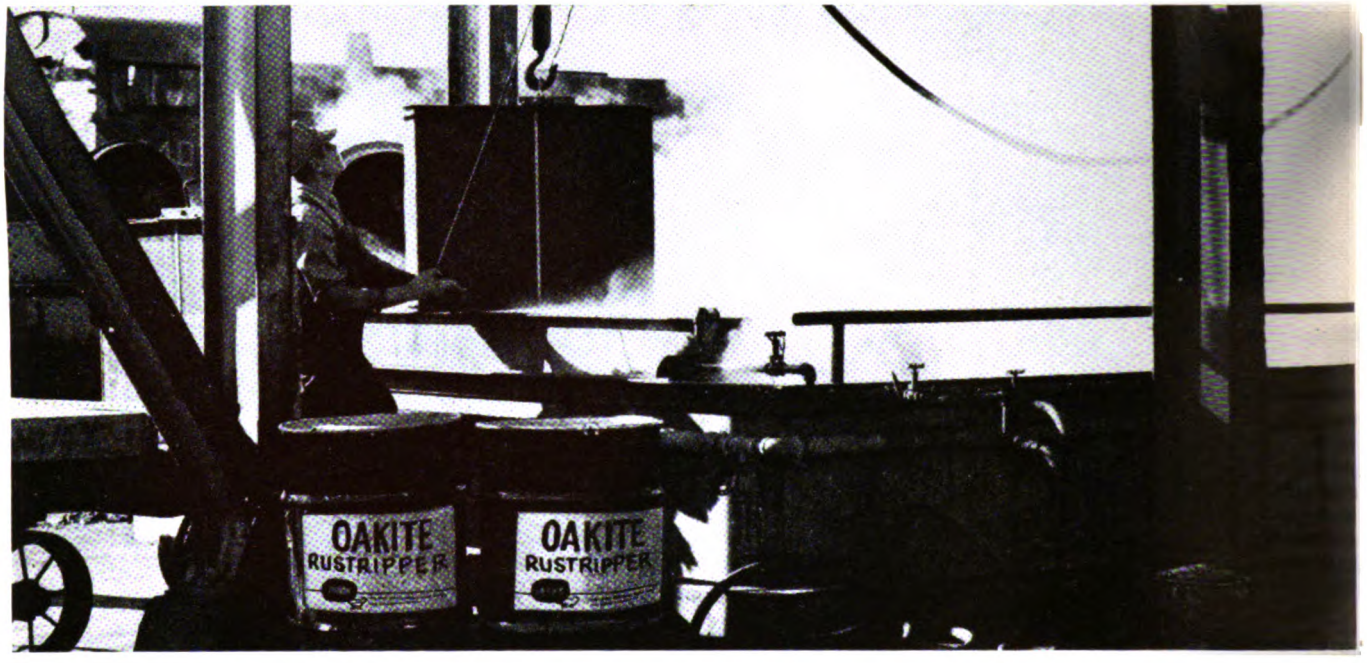
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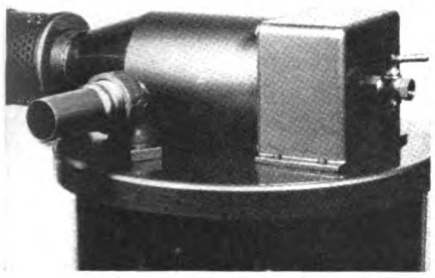
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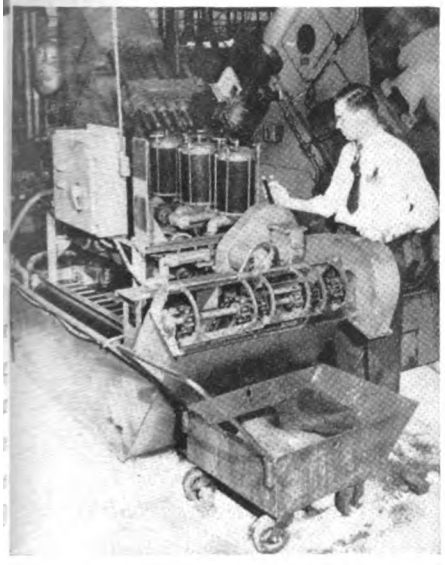
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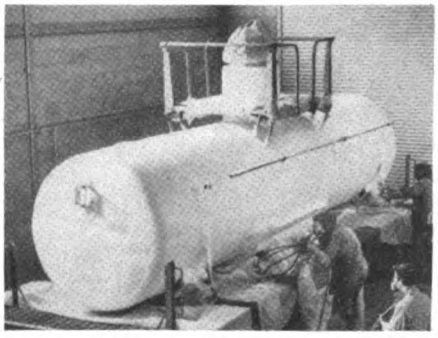
Vacuum Cleaner

The Northeast high-power ejector type vacuum, suitable for cleaning diesels, box cars, etc., fits 30- and 55-gal drums. It operates on compressed air, has no moving parts, and will pick up almost anything that will pass through a 2-in. suction hose. It will pick up material such as sand at a rate of 4,000 lb per hr, or liquids at almost 6,000 gph. *Northeast Industries, Inc., Dept. RLC, 282 Greenwood ave., Midland Park, N. J.*



Cartridge Filter

A combination separator and cartridge filter will filter materials down to 5 micron size in capacities from 20 to 500 gpm. The dirty solution enters the separator by retarded movement through overflow weirs, most of the solids being separated before the liquid is pumped through the cartridges for filtering. Cartridge filters contain pleated paper elements which are made in 5, 20, and 40 micron retention sizes. Pleats are uniformly spaced and reinforced with nylon bands to provide strength for back-flush pressure and to keep pleats apart during the filter cycles. By timed electronic control, each cartridge is back-flushed in sequence, using the filtered liquid from other cartridges. The back-flushed liquid containing the dirt flows into a conveyorized seeper tank, from which it slowly flows through small holes to a settling tank where it is held until solids are settled. Liquid then overflows to the pump section for recirculation. Conveyors in all sections remove solids to tote box. *Henry Mfg. Co., Dept. RLC, 538 East Reed st., Bowling Green, Ohio.*



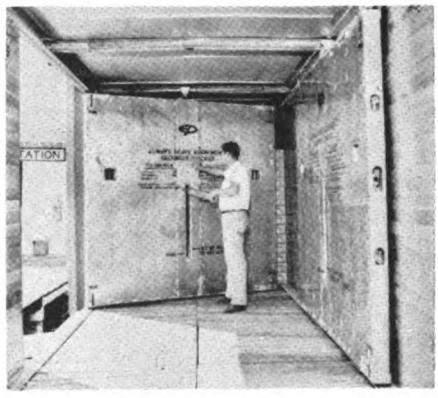
Urethane Foam Jacket For Tank Cars

A urethane foam jacket which is expected to withstand the flexing and jolts of normal tank-car service is being tested on the shells of two 4,000-gal cars. The cars were sprayed with a 4-in. thick jacket of rigid urethane foam blown with General Chemical's Genetron fluorocarbon gas, and a 40-mil-thick light gray coat of catalyzed polyester reinforced with chopped glass fiber roving was sprayed on for vapor sealing. About 575 lb of 2½-lb density rigid urethane foam was used.

The cars will carry urea-formaldehyde fertilizer solutions at about 77 deg F. The rigid urethane foam blown with Genetron fluorocarbon gas is said to be superior in insulating effectiveness to the insulation regularly used. The insulation and steel outer jacket combination now used on tank cars weighs about 6 lb per sq ft; the urethane foam jacket, 1 lb per sq ft. In case of a wreck, damaged foam could be cut away and replaced by spraying. *Allied Chemical Corp., National Aniline Div., Dept. RLC, 40 Rector st., New York 6.*

One-Piece Bulkheads

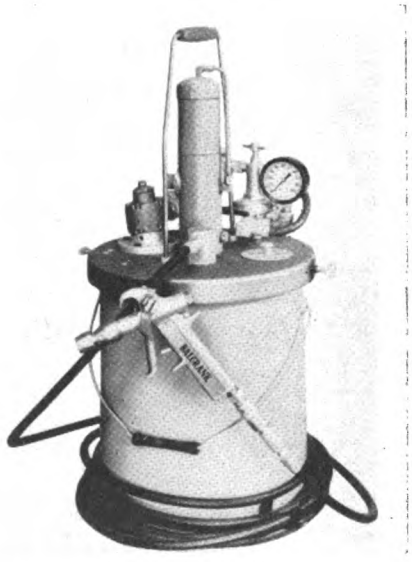
The DF-B one-piece metal bulkheads are movable partitions used two to a box car. Bulkheads are suspended from traveling beams which span the width of the car. Beams are roller mounted on tracks along the car roof at the side walls. The bulkheads, pivot mounted on the track on the traveling beam, permit a full 360-deg turn. Either or both can be rotated 90 deg for storage against car sides, or locked against car ends. A single locking and unlocking lever in the center of each partition serves as a handle for positioning the bulkhead. Releasing the lever engages the pins in holes



in locking tracks at sides of floor and ceiling. The lever will not seat unless all four pins are in place. *Evans Products Co., Dept. RLC, Plymouth, Mich.*

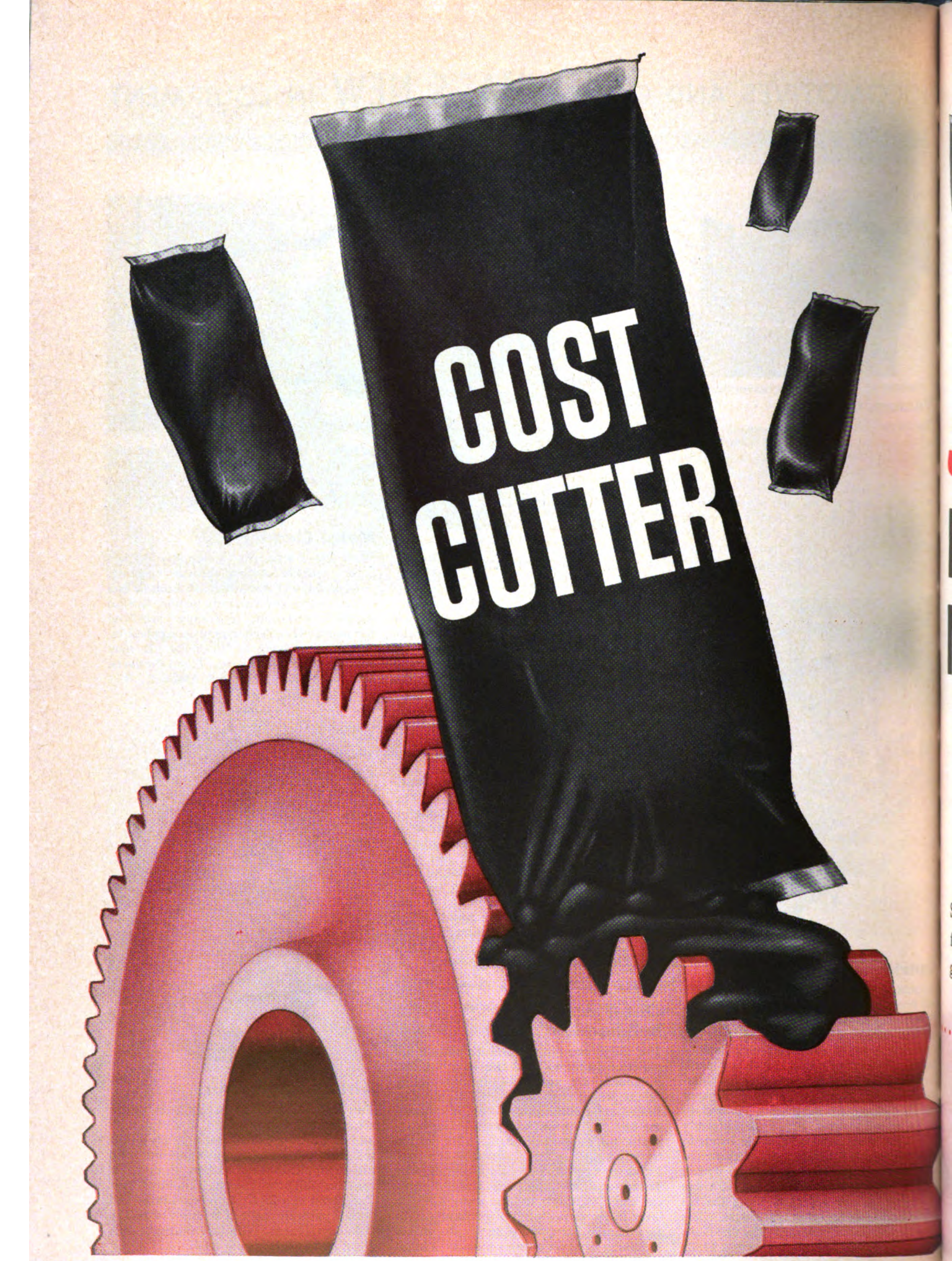
Metal Cleaner

W. O. No. 1 is designed to simplify the prepaint treatment of metal surfaces, cleaning, passivating, and removing corrosion in one step. It produces a slightly porous surface which absorbs primer, providing a firm base for paint. The cleaner may be applied by brushing, spraying or swabbing. It may also be used by immersion. *Turco Products, Inc., Dept. RLC, 24600 S. Main st., Wilmington, Calif.*



Airless Spray Units

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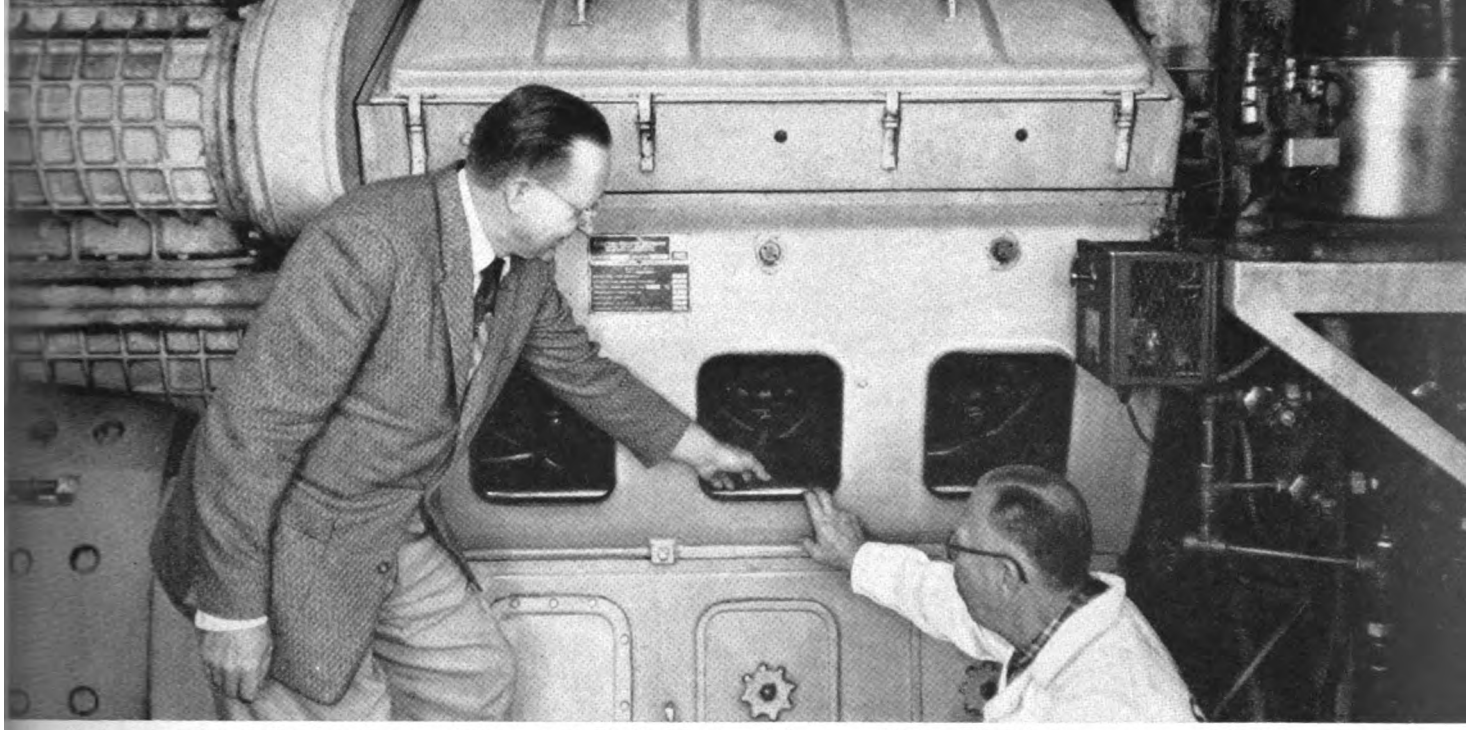
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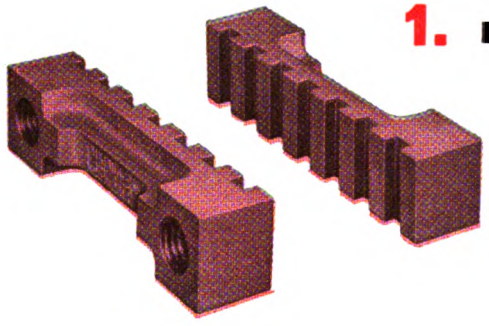
Your Shell Railroad Service Engineer will give you the details. Or, write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

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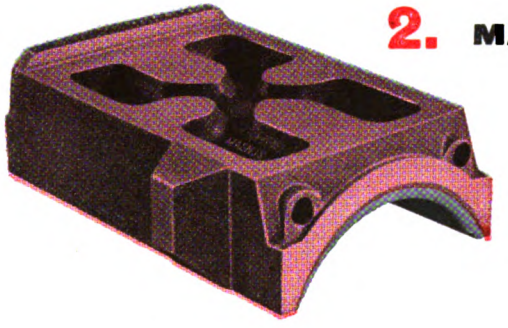
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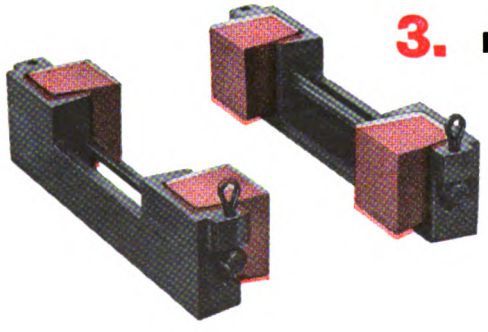
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Wider, non-tilting design limits bearing displacement—provides effective stabilization at lower cost



3. MAGSTOPS

Offer the inherent advantages of R-S Journal Stops in a low-cost, rugged, fabricated design

THE NEXT big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

JOURNALS—

get BETTER BEARING PERFORMANCE

Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures —increase miles per hot box *ten times;* miles per cut journal, *fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.

Journal Stops give the low-cost solid bearing a chance to work at optimum efficiency, not just part of the time, but *all* of the time! They can be easily installed on any freight car, new or old. And they increase new car costs less than 2%—*pay for themselves* in less than 3 years!

Wear on R-S Journal Stops is slight, and Stops can be re-shimmed should wear become excessive. The Stops should last the life of the side frame.

The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust guard, tends to prevent spread linings in the bearings.

The flat-back bearing is also manufactured to "pre-war length," increasing resistance to impact and wear at both collar and fillet ends. Its greater mass and weight result in a more *rugged* bearing with inherently greater life expectancy.

Magnus flat-back bearings are interchangeable with any standard raised-back bearing, simply by using a flat-bottomed wedge. Bearing dimensions, in each size, are the maximum which can be easily installed in the journal box through the standard lid opening.

Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The big advantage of the MAGSTOP is low-cost installation that can be accomplished quickly whenever side frames are removed for any reason. The bronze inserts provide ample bearing area and can easily be replaced, if required, without shopping the car.

By limiting journal movement within the box, MAGSTOPS greatly increase bearing life, protect against dust-guard damage, prevent loss and contamination of lubricant. They reduce wheel flange wear, too.

MAGNUS **METAL CORPORATION**

Subsidiary of **NATIONAL LEAD COMPANY**

GEARED TO PROGRESS P R I MEMBER

EDITORIALS

Fighting Back

Proposed legislation introduced into the U.S. Senate would be, if passed, a major defeat for the railroads in their battle to obtain equal treatment in meeting our national transportation requirements. All in the railroad industry should voice their protests to this legislation by writing to the two U.S. Senators representing them in Congress.

Two bills, the Bartlett (S.1197) and the Yarborough (S.1089), should be defeated. The truckers and waterways operators are supporting the Bartlett bill; the waterways operators are in favor of the Yarborough bill. The bills would wipe out the rate-making freedom that the Transportation Act of 1958 gave the railroads and other carriers regulated by the ICC.

For more years than railroaders care to remember the railroads have been losing traffic to tax-supported competition. Now, by use of equipment designed specifically for the traffic it hauls, the railroads have been recapturing some of the business that went to their subsidized competitors. Piggyback and new double-deck and triple-deck automobile cars have made it possible to haul highway trailers and automobiles at lower costs than this traffic could be moved over highways. The Transportation Act of 1958 made it possible to charge rates commensurate with these lower costs. The proposed bills would require the railroads to again hold a "rate umbrella" over their subsidized competition.

All in the railroad industry should be against these bills. They are not in the public interest because the nation needs a strong, healthy railroad industry as the backbone of our transportation system. They are not in the interest of railroaders whose jobs would be threatened by further weakening of the railroads' already precarious position. We urge that our readers voice their protests to their senators and also be "for something" by voicing their support for the "Magna Carta for Transportation" that we outlined on this page in our April issue.

Gearing Wheel to Rail

Sand between the wheel and the rail has long been the most effective and widely accepted means for improving adhesion for railroad vehicles. Unfortunately, the use of sand involves some very practical difficulties. Getting dry sand on the rail is an involved and expensive process, and keeping it there until it has served its purpose is difficult. Sand may also cause locomotive troubles and faulty signal operation; eventually it must be cleaned out of the ballast.

New methods for improving adhesion are constantly being tried. Probably the newest and most novel is "electric sparking" now undergoing tests on the French National Railways. To do this, the French employ two parallel circuits. One is a high voltage circuit which will ionize the air in two air gaps, and the other is a low-voltage circuit which will cause relatively heavy current to pass across the gaps. One of the gaps is between an electrode and the rail and the other between an electrode and the wheel. The effect is to remove surface contaminants, increasing the coefficient of adhesion between rail and wheel surfaces.

Electric sparking is only one of several methods for improving traction being tried by the French railways. Others have included anti-lubricants other than sand (such as powdered glass and carborundum); anti-lubricant slurries applied to the rail; and a rotating wire brush acting on the rail ahead of the wheel. Single-motor trucks with axles coupled through gearing; parallel-connected traction motors; low truck center supports; and other basic design characteristics have been adopted for new locomotives.

Anti-lubricants other than sand have been found, but none that can approach it in cost. Slurries have been found effective in American trials, but they have fallen short because they must be applied to the rail and allowed to dry or to react with contaminants prior to the passage of a train.

Trucks with their axles geared together are being applied to new French cars and locomotives. This increases the cost of the trucks and means that there can be little variation in wheel size. Low center supports on trucks minimize weight transfer from one axle to another, reducing the need for making an electrical torque transfer.

It is common American practice to operate diesel locomotives at low speeds with motors connected in series. This means that, at the lower speeds, motors accelerate more rapidly when they slip. It is common European practice to connect all traction motors permanently in parallel. This is helpful in reducing slip, but it increases the price of electrical equipment.

For several years, the Swiss have effectively controlled wheel slip and practically eliminated the use of sand by means of high-speed brakes which make a light brake application in less than half a second. Swiss locomotives have parallel-connected motors, and the brakes are usually applied manually on single locomotives units. It remained for American manufacturers to prove that it could be done automatically on multiple-unit locomotives with series-connected motors at low speeds, also with parallel motors at high speeds.

American operators will probably look upon electric sparking with a jaundiced eye. It is barely out of the laboratory. But the idea should not be discarded summarily. Sparking, as it is called, apparently does much to increase low-speed adhesion. While measurements indicate that it might increase rail wear very slightly, its net effect on the rail could be beneficial.

New processes and new materials constantly make practicable what were once considered "crack-pot" ideas. It seems fair to assume that railroads will gradually solve their adhesion problems. Then for all practical purposes, the driving wheels will, in effect, be geared to the rail.

THE SANTA FE'S FAST FREIGHTS KEEP EXACTING SCHEDULES WITH AN ASSIST FROM NATIONAL BRUSHES

TRADE-MARK

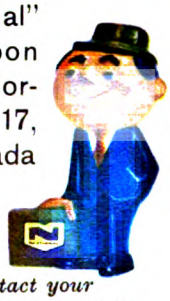


Progressive railroads like the Santa Fe are using fast freights for improved, accelerated service for their customers. This modern service requires trouble-free motive power with minimum lost-time for maintenance.

Every component in the complex locomotive—no matter how small or large—must perform dependably under conditions of heavy loading and high speed to meet the exacting requirements of the Santa Fe.

"National" generator brushes—small but vital components—offer proved commutation and life qualities and operate with the reliability so necessary for today's progressive railroad service.

One of our contributions to improved railroading is a positive service program on carbon brushes. Just call your "National" Brush Man or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. In Canada: Union Carbide Canada Limited, Toronto.



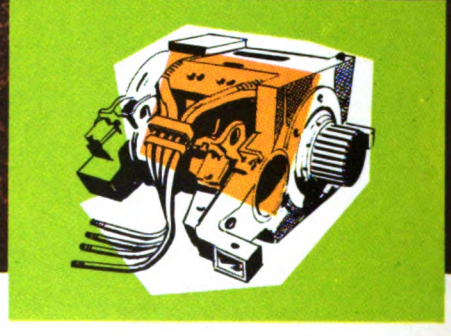
Contact your "National" Brush Ma

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NATIONAL CARBON COMPANY

N. Y. CENTRAL'S "SUPER-VANS" KEEP PRECISE SCHEDULES WITH AN ASSIST FROM NATIONAL BRUSHES

TRADE-MARK



Because of fast freights or "Super-Vans" as they are known on the New York Central, today's major tonnage is returning to the progressive railroads of the nation.

To maintain precise schedules, every component in the consist—no matter how large or small—must offer exacting performance and rugged reliability.

"National" traction-motor brushes—wherever they are used—provide dependable life and commutation and thereby contribute to added miles with a reduction in commutator maintenance costs.

To National Carbon Company, improved railroading means a positive program to help the roads solve problems imposed by constantly changing and more difficult electrical conditions. To realize this assistance, just call your "National" Brush Man or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.

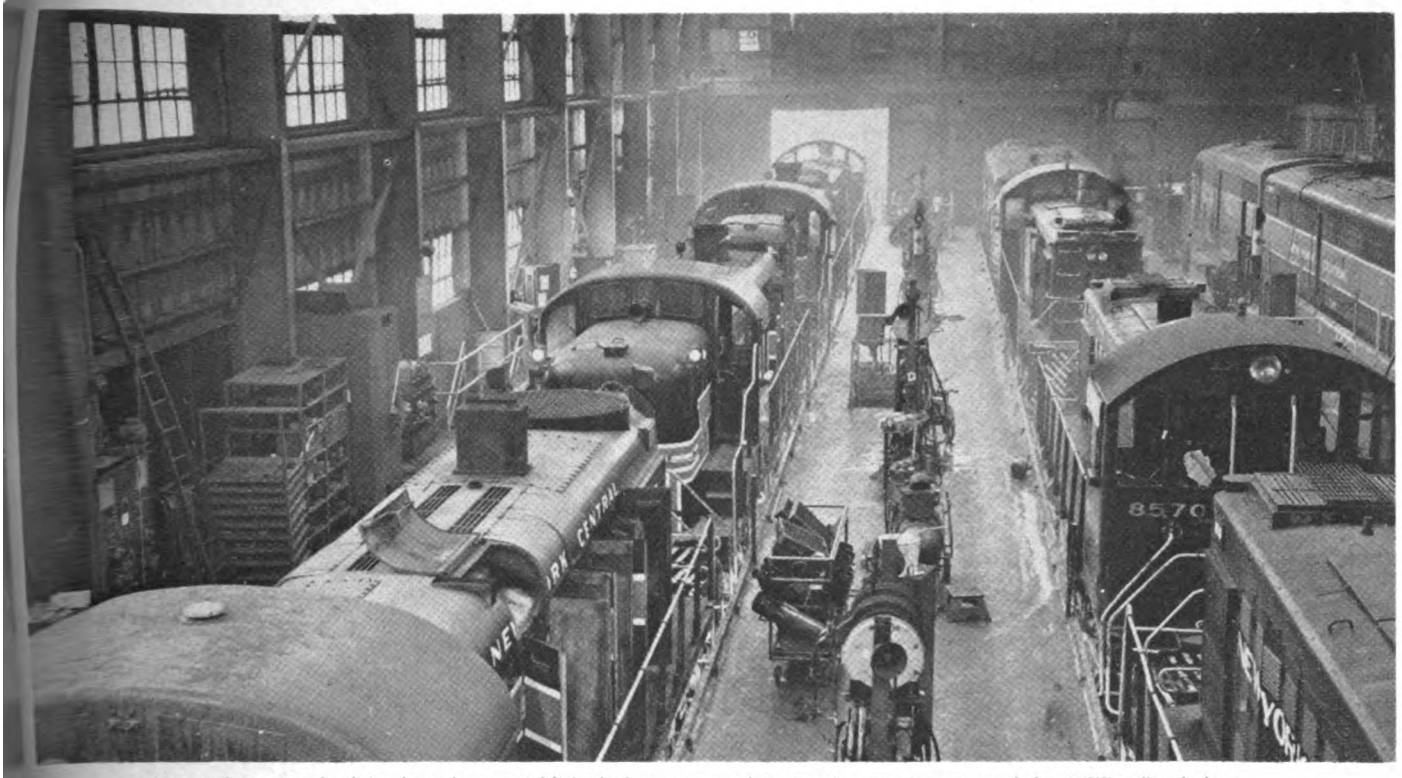


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Spot maintenance facilities have been established along one track in running-repair section of the DeWitt diesel shop.

Spot Maintenance for NYC Alcos

Introduction of production—line techniques for diesel maintenance yields numerous benefits

Increased production, more precise control of work quality, and greater locomotive availability are all benefits achieved by the adoption of a spot maintenance system for New York Central Alco locomotives. The Central's DeWitt diesel shop at Syracuse, N. Y., location of this operation, is adjacent to the largest NYC yard east of Buffalo.

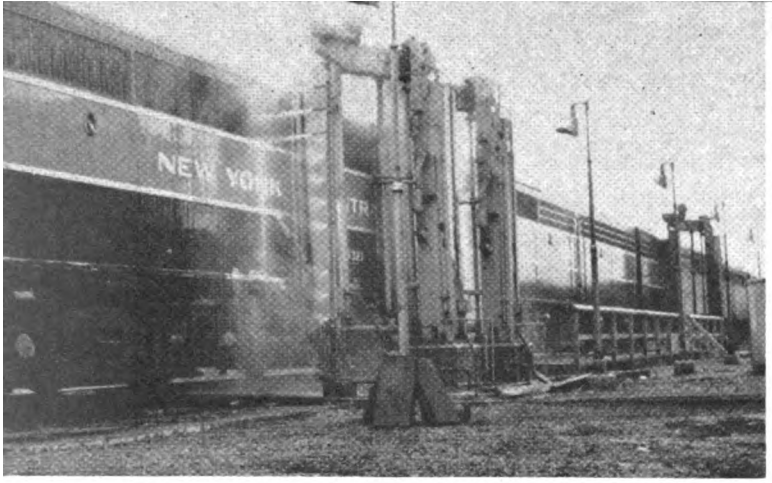
Long before "spot" maintenance was developed, the Central assigned practically all its Alco locomotives on the lines east of Buffalo. While even then DeWitt served as the "hub" of this Alco operation, maintenance was done at most of the major terminals in the territory. These included Buffalo, N. Y.; Rochester, Watertown, Utica, Selkirk yard (near Albany), West Springfield, Mass., and several other points.

In May 1959 the "spot," or "progressive track," system was introduced at DeWitt and was assigned the maintenance of 355 Alco road and switcher units. Along with the DeWitt yard switchers, these included most of the main line road freight and road switcher units, all of which could be worked in and out of DeWitt readily.

Introduction of the system followed NYC investigations aimed at reducing the costs of locomotive maintenance. The system then established was a four-station operation. It was set up on one of the three "through" tracks which extend through the 250-ft length of one of the shop's two bays. The shop is a typical three-level design used by many railroads.

As maintenance techniques were refined, more and more units were assigned to DeWitt for maintenance. Today, all Alco road power and almost all of the switchers on the Eastern District — a total of 546 units — are brought to DeWitt for periodic work. Each unit comes in once monthly for preventive maintenance and necessary ICC work and inspection. These operations are handled by the "spot" system.

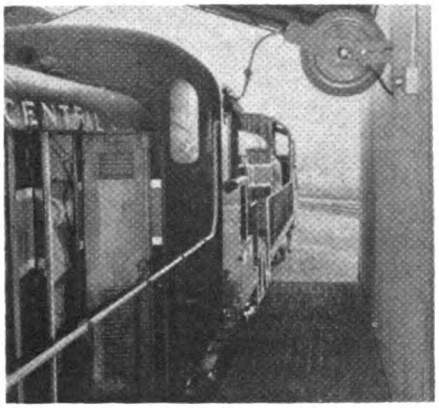
When the shop load was increased to 546 units, it was impossible to handle this volume of work efficiently on the four original spots. It was then that the number of work stations was expanded to six. This required the construction of shelters at both ends of the shop. On the inbound end, the shelter is used for preliminary inspection and cleaning of engines and electrical equipment. On the outbound side, the shelter provides an area where locomotives can be started and



Carbody cleaning is completed before locomotives enter the shop.



Shelter at entrance of shop is Spot 1 where unit is inspected.



Air hose reels are installed at Spot 1 for blowing of electrical equipment.



Cleaning machines are adjacent to spots where components are removed.



As unit leaves shop, clock automatically advances to indicate next 70-min period.

checked following the actual maintenance operations which are carried on inside the shop.

In addition to setting up one track with the progressive arrangement for preventive maintenance and for monthly and quarterly ICC inspections, the adjacent track has now been equipped for use exclusively for ICC semi-annuals and annuals. These are not handled on a progressive basis, but, daily, four units are placed on this track, all scheduled for completion in 16 hrs. Some specialized equipment has been installed along this track for use in conjunction with the tests and work accompanying the ICC annuals and semi annuals.

The progressive track has been tooled and aranged to handle the large number of units which pass over it. Periodic maintenance is a three-shift operation, with each locomotive advancing to a new work station every 70 min. Work is distributed among the "spots" so there will be a minimum of interference between the mechanics performing different jobs. There are 21 men for each shift on this "progressive track."

Spot 1, the shelter at the west end of the shop, is designated as the "ICC Inspection" spot. When a unit arrives at this location, the following are checked: cylinder firing and operation of fuel injection system; air compressor operation and oil pressure; leakage of lubricating oil, fuel oil, water, and exhaust gasses around the engine; battery and battery charging system; fans and shutters, and engine shutdown. The engine is then stopped and the main generator is blown with compressed air. Only equipment at this location is a pair of air hose reels.

Units are not put through the progressive track with engines running. By using battery current to power the traction motors, one of the six units on the track can move the other five at the 70-in. intervals.

Operation at Spots, 2, 3, 4, and 5 are indicated in the accompanying illustrations. Each of the assignment boards is painted the color which designates that spot. All the tools and equipment used at the site are also painted this same color. For each "spot" there is a work report corresponding to the assignment boards illustrated.

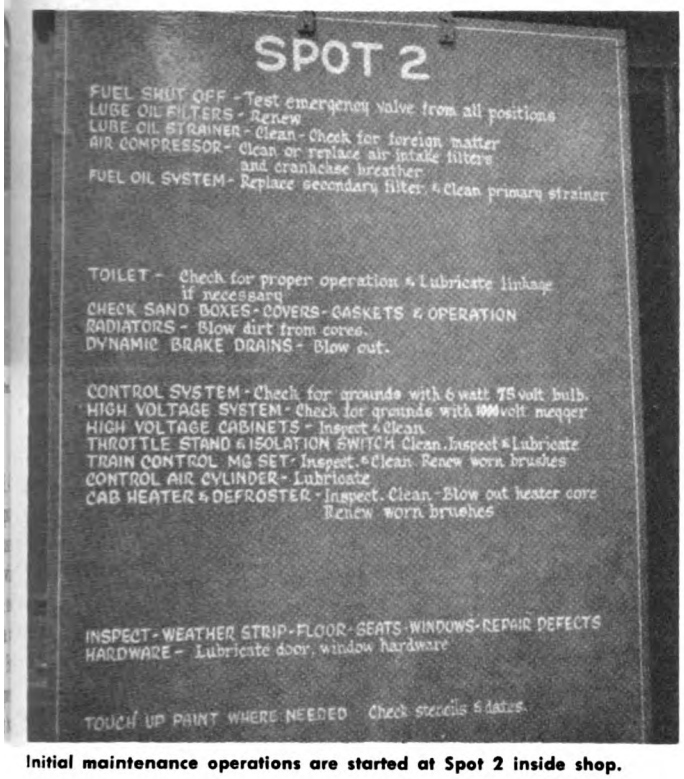
At Spot 2 there are racks for fuel-oil filters, fuel-oil strainers, air-compressor filters, filter-tank gaskets, jumper cables, and brake shoes. A test board for jumper cables is also located here. There are hose reels for cutting gas, compressed air, and water.

At Spot 3 are cabinets for stocking pipe fittings, injectors, motor and generator brushes, sander valves, air hoses, and knuckles. Benches are installed for working on components requiring adjustment or lubrication at this spot. There are hose reels for cutting gas and compressed air, and a connection for draining lubricating oil.

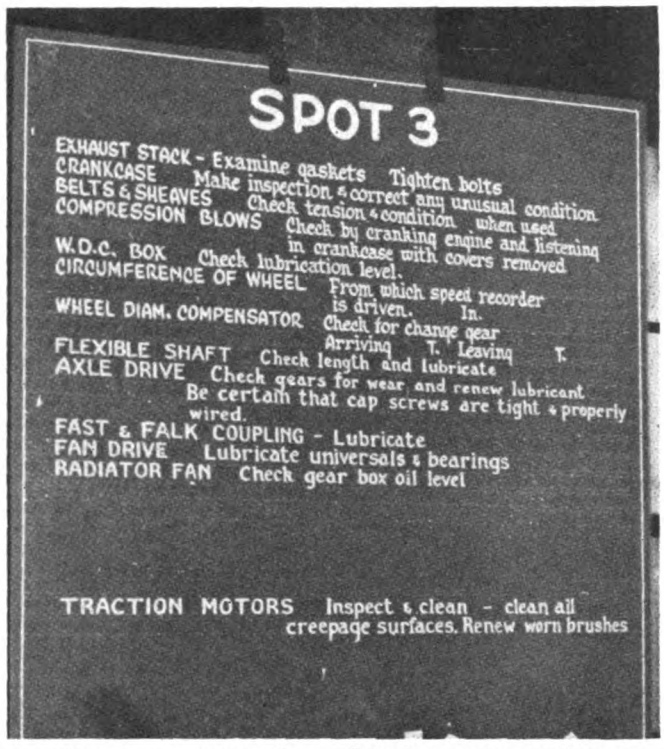
Spot 4 is the location where engine and carbody filters are removed for cleaning. A washing machine for these air filters and a smaller unit for cleaning lube oil strainers are located here. There are racks for the filters, for miscellaneous hardware, and for windshield wiper equipment. Hose reels supply lubricating oil, grease, cutting gas, water, and compressed air. There is a welder at this spot for use in making repairs where welding is necessary.

At Spot 5 work is completed on the unit. Clean filters are installed, work on electrical equipment is completed, and lubricant and cooling water levels are checked. The carbody interior is cleaned. There are hose reels for cutting gas, lubricating oil, water and compressed air.

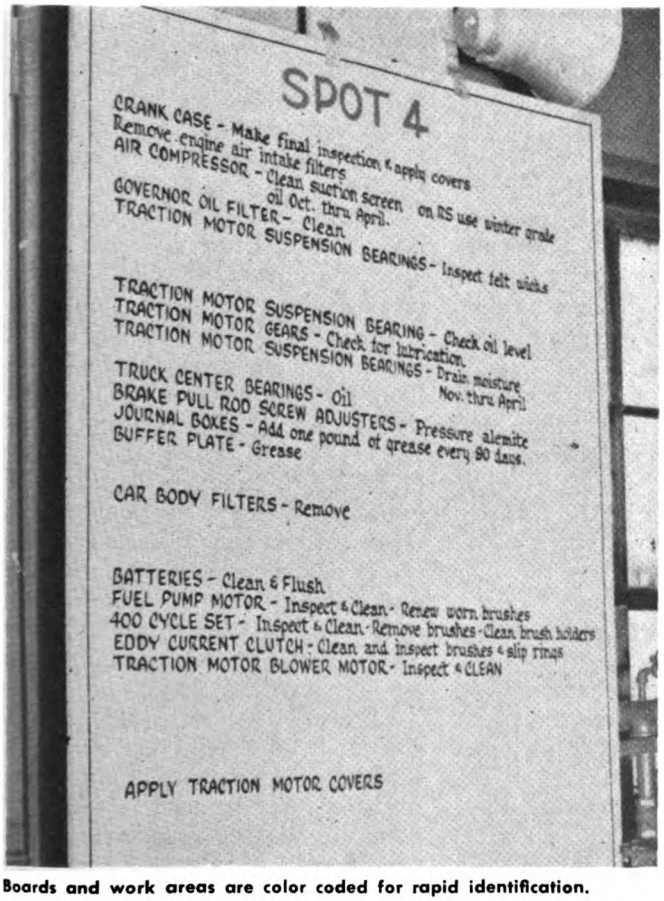
The unit then moves to Spot 6, the shelter at the east end of the building, where the engine is started and a se-



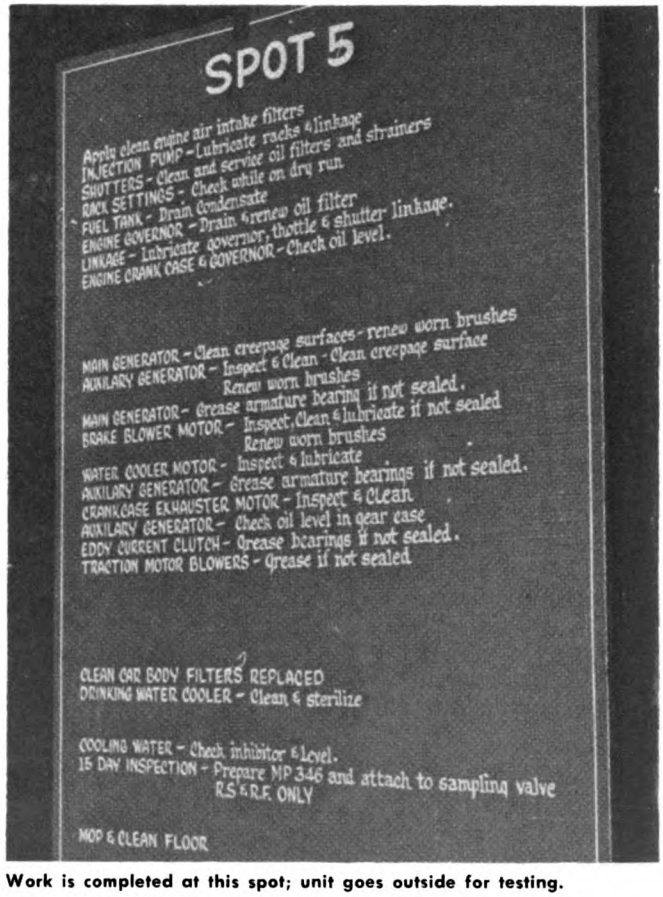
Initial maintenance operations are started at Spot 2 inside shop.



Operations are arranged so there will be little worker interference.



Boards and work areas are color coded for rapid identification.

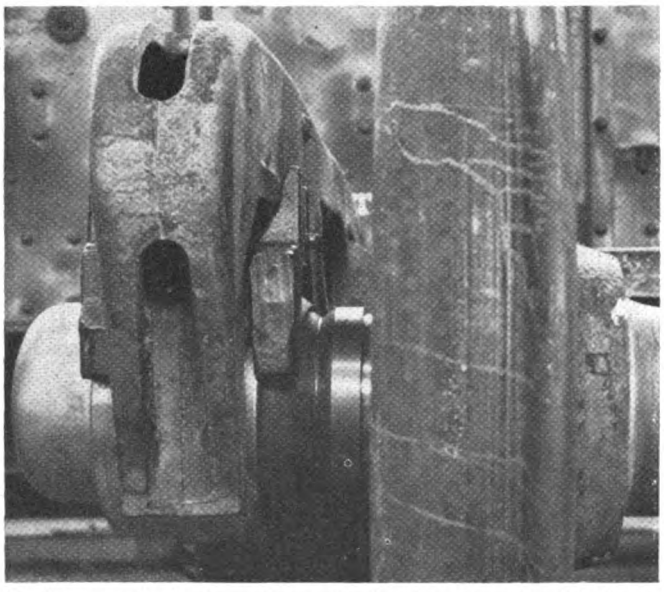


Work is completed at this spot; unit goes outside for testing.

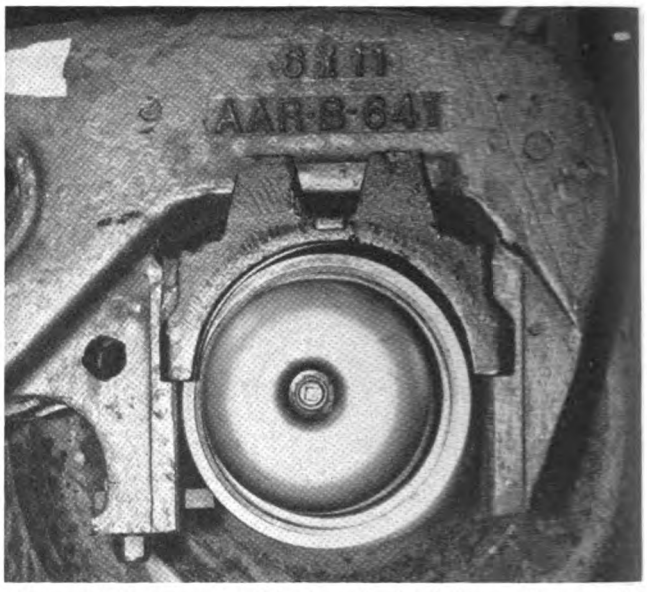
quence test is made. Fuel unit, PC switch, alarm bell, and 400-cycle motor alternator are all checked. Ground switch and overspeed are sealed. The unit is then dispatched for another month's service.

All types of Alco freight and switcher units are maintained on this line, including: 1,500-hp and 1,600-hp road freight; 1,000-hp, 1,500-hp, 1,600-hp, and 1,800-hp road switcher; and 660-hp and 1,000-hp yard switcher.

NYC now has a similar facility at Collinwood shop at Cleveland, Ohio, for maintaining General Motors units. This six-spot arrangement now handles most of the work on the motive power used on the lines west of Buffalo.



Displacement of adapter on large roller bearing means that side frames will not be parallel and that bearing will be improperly loaded.



Adapter displacement should be immediately obvious to inspector when he comes upon this large roller bearing in wide pedestal side frame.

Uniform Roller Bearing Inspections

More thorough and more uniform inspections should be made of the bearings on roller-bearing freight cars. To achieve this, the AAR Mechanical Division has just issued instructions for the routine inspection of these cars in train yards and also for shop-track inspections following overheating, derailments, and other accidents.

Rapid growth in the number of cars equipped with roller bearings means that car inspectors and car maintenance men are encountering these cars with increasing frequency. "Many . . . are not familiar with freight-car roller-bearing applications and proper [inspection] is not always given to these cars," cautions the Mechanical Division circular letter containing the new inspection procedures.

The Division's Committee on Journal Roller Bearings, working with the manufacturers, has prepared a set of instructions which apply to all types of AAR approved and conditionally approved bearings now in service. The information will later be incorporated in regular AAR publications.

Bearings to which the instructions apply are the compact package units which fit the AAR narrow-pedestal side frames and have the end caps which rotate while cars are in motion, and also the large bearing units which can be applied only in the wide-pedestal side frames (at present only one type of this design has received even conditional approval). While the large roller bearing can be applied only in the wide-pedestal frame under the AAR standard wide-pedestal adapter, a series of different arrangements can be used for the installation of the smaller bearing units. According to the Mechanical Division, the car inspector may find the smaller package roller bearings installed in any of the following ways:

- Under the AAR standard adapter in the AAR alternate-standard, narrow-pedestal side frame;
- Under the AAR standard adapter in any conventional integral-box side frame modified for the roller-bearing application;
- Under the large AAR standard adapter in the AAR standard wide-pedestal side frame.

Routine Inspection

According to the Mechanical Division routine car inspections should include the following checks of roller bearings:

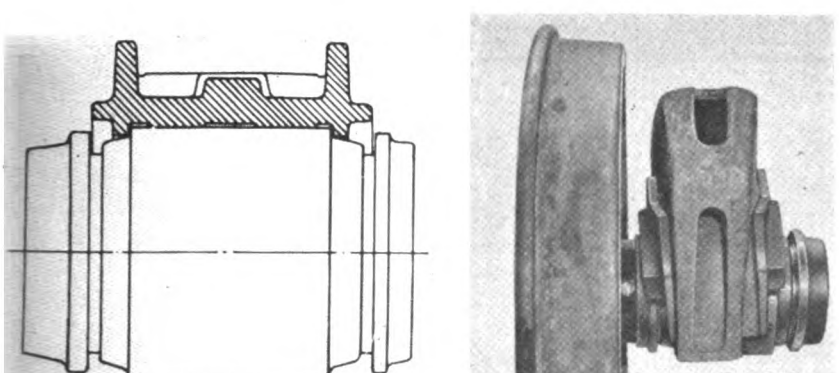
Check operating temperature. Running temperatures 15 to 50 deg F above ambient can be expected in normal operation. Check by placing the bare hand against the frame adapter. An overheated bearing would have an adapter on which the hand could not be held for a few seconds. End cap temperature may be considerably higher than the bearing temperature and should not be used as a point to check temperature. If an overheated roller bearing should be found, no lubricant, other than AAR-approved roller-bearing grease, should be applied, unless the bearing has obviously been destroyed by the overheating.

Inspect for damaged or missing parts. Observe the external appearance as compared to other assemblies on the cars.

Inspect seating of the adapter. All frame adapters have a pair of thrust flanges projecting downward to center the adapter on the bearing. These adapters can be displaced so that one of the thrust flanges will rest on the outside diameter of the bearing, leading to early bearing distress.

The adapter may be displaced when assembling the truck, while rerailing a derailed car, or when moving a car truck by hooking an overhead crane to the bolster or side frame instead of to a wheel or axle. Any time that the adapter is disengaged from the bearing there is a possibility that it may not seat properly when again lowered into position. Wide-pedestal and narrow-pedestal adapters may be displaced in this way, and their position on the roller-bearing units should be carefully checked.

Narrow-pedestal side frames are designed so that the narrow-pedestal adapter cannot normally be displaced, although derailments might damage the retainer key in the pedestal leg.



Adapter properly seated on bearing (left) may at times be displaced if side frame is lifted or raised from wheel set. Improper alignment resulting is obvious from end of truck (right).

allowing the bearing and adapter to separate. When the narrow adapter is used in the integral-box side frame with the rotating-end-cap roller bearing, the side frame could become misaligned over the roller bearings, because the adapters have been displaced on the bearing surfaces. It is necessary to look into the journal box to check this condition. Compare each assembly with the others on the same car to determine if any adapters are out of place. This will tend to tilt the entire side frame and will load the bearing at only two points, a condition conducive to early failure. One of the thrust flanges on the displaced adapter may also be contacting either the rotating end cap or the rotating dust guard ring on the inside of the bearing assembly. In addition to being displaced outward or inward on the bearing, the adapter may tend to rotate inside the box.

When rotating-end-cap roller bearings are installed in wide-pedestal side frames with the wide-frame adapters, it is possible for the adapters to get out of alignment because they can be lifted from the bearing under the circumstances indicated above. The top of the adapter may be displaced outward or inward and, in either case, the adapter will be loading the bearing at only two points, a condition which can lead to early failure. The thrust flange on the displaced adapter may also be contacting either the rotating end cap or the rotating dust guard ring on the inside of the bearing assembly, as was the case with the integral box installation.

It is also possible to find the wide pedestal adapter improperly seated on the large roller bearing and alignment of these applications should be checked by car inspectors.

Shop-Track Inspection

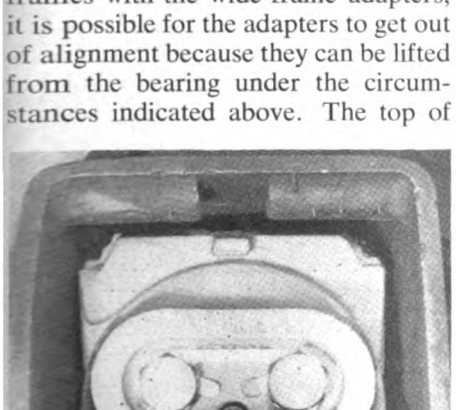
The Mechanical Division has also informed its membership that, when cars with roller-bearing units have been derailed, or when it is suspected the bearings may have been damaged from any other cause, the cars must be shopped and inspected. The specified procedure for inspection after derailment covers all the truck components in contact with the roller bearing. The Division has also indicated that the adapter which has been used with a bearing that was overheated should, before being reused, be inspected in compliance with adapter item (below).

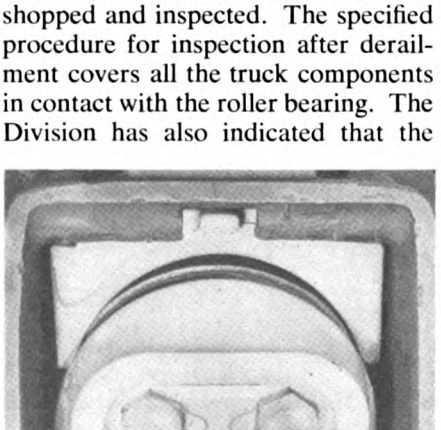
Bearings. Bearings should be dismantled and all internal surfaces examined for Brinelling which could cause subsequent failure. Bearings which have overheated in service, or which have been subjected to heat from external sources, such as fires and flame throwers, must be removed from the axle and checked.

Axles. All axles from roller-bearing-equipped cars which have been involved in derailments shall, after the removal of bearings, be placed in an axle lathe to determine if axles are bent. The oscillating movement and uneven load distribution of a bent axle can cause a bearing failure.

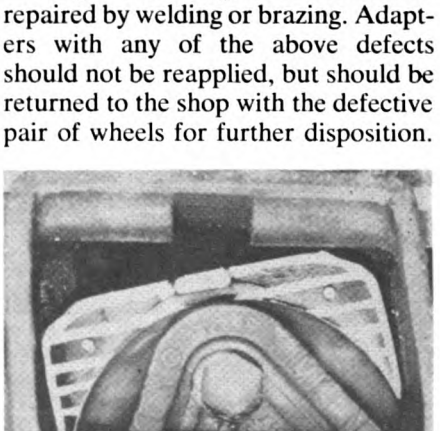
Side frames. Side frames should be inspected to determine if they are bent or distorted. Side frames which are bent or distorted will cause undesirable loads on the bearing assembly which can lead to bearing failure.

Adapters. Examine the bore surface of the adapter which fits over the bearing for any ridges, grooves, or metal build-up which would prevent proper seating on the bearing. Check the adapter for distortion by placing the adapter over the replacement bearing. It should seat firmly on the bearing without pinching or rocking when hand pressure is applied on top of the adapter. Adapters which are warped, twisted, or otherwise distorted should not be reapplied. Cracked or broken adapters must not be reapplied, and must not be repaired by welding or brazing. Worn adapters should not be repaired by welding or brazing. Adapters with any of the above defects should not be reapplied, but should be returned to the shop with the defective pair of wheels for further disposition.





Adapter over bearing in modified integral-box side frame may be displaced laterally. Proper condition (left) is not readily distinguishable from the displaced condition (right).



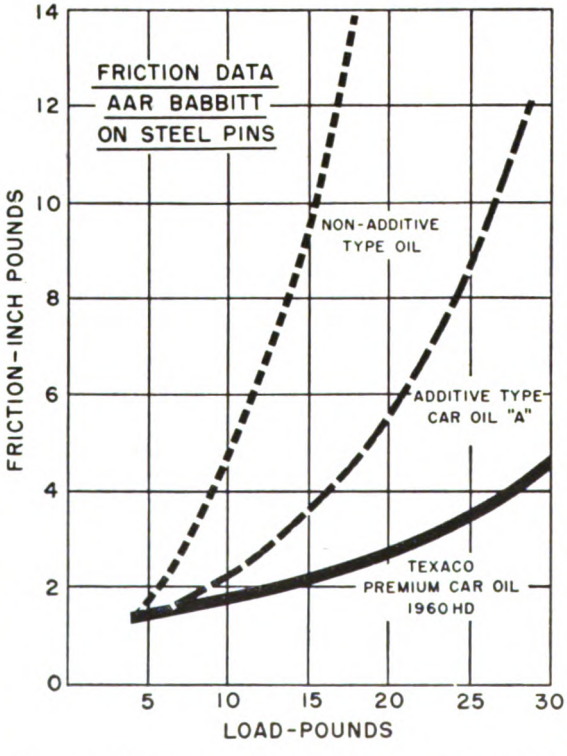
Adapter may rotate inside integral-box side frame and should be checked by inspectors.

PREMIUM OR NON-ADDITIVE TYPE OIL? *Premium* Texaco

Three reasons why new can help reduce hot

60% less friction

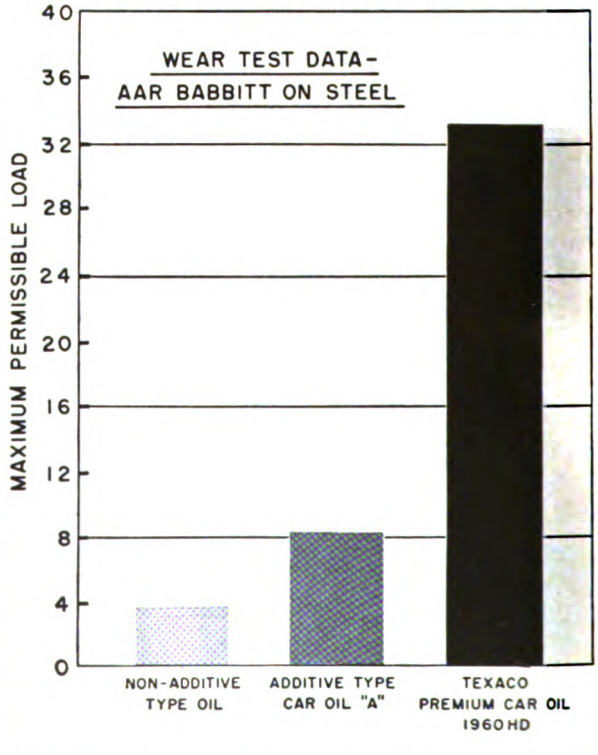
Less friction means lower operating temperatures . . . an important reason why Texaco Car Oil 1960 HD can help cut hot boxes as much as 40%. A special additive gives Car Oil 1960 HD a 60% lower friction coefficient under heavy load than most non-additive type oils.



Lower friction coefficient of Texaco Car Oil 1960 HD graphically illustrated. Car Oil 1960's ability to resist friction becomes even more pronounced as load-pounds are increased. The uniform quality of Texaco Car Oil 1960 HD assures consistently reliable performance.

8 times greater load-carrying capacity

Metal-to-metal contact between journal and bearing, the result of localized high bearing pressure, is a common beginning of hot boxes. Actual tests at Texaco's Research Center prove that Car Oil 1960 HD retains its protective oil film at a pressure *8 times greater* than the failure point of a non-additive type oil.



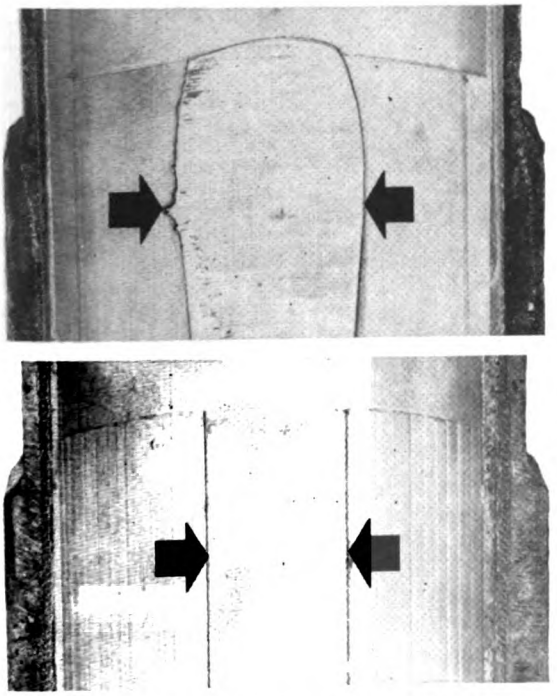
Greater load-carrying capacity of Texaco Car Oil 1960 HD graphically illustrated. Car Oil 1960 HD retains its protective oil film at a laboratory pressure much greater than would be encountered under average operating conditions.

Car Oil 1960 HD can actually prove more economical

Texaco Car Oil 1960 HD boxes as much as 40%

Minimum bearing metal displacement

Scored, worn, and misaligned bearings are also a common cause of hot boxes. Texaco Car Oil 1960 HD has a built-in characteristic that hinders gross bearing metal removal. Instead, Car Oil 1960 HD redistributes minute amounts of babbit...*actually assists in reseating the bearing.*



Smoother bearings with Texaco Car Oil 1960 HD. Contact areas of above journal bearings were reduced to 9 sq. inches and subjected to identical tests. Serrated edges (arrows) on top bearing, run on non-additive type oil, indicate considerable metal displacement. Straight edges (arrows) on lower bearing, run on Texaco Car Oil 1960 HD, indicate almost no metal displacement.

Savings can reduce car oil costs by 22c a gallon

Five major roads reported up to 40% decreases in hot boxes after switching to Texaco Car Oil 1960 HD. Savings because of reduced hot boxes can more than offset the slight additional cost of premium Texaco Car Oil 1960 HD.

For example: Suppose a road using 200,000 gallons of car oil yearly reduces hot boxes from 1,100 to 660 by switching to Car Oil 1960 HD in all journal boxes—using both summer and winter grades. A minimum saving of $100 on each eliminated hot box would net this road $44,000. This sum, if applied to the purchase price of the car oil, would reduce its cost by 22¢ a gallon. Therefore, in real terms, the per-gallon-price of Texaco Car Oil 1960 HD is actually about 16¢ less than the price previously paid for the non-additive type oil.

For full details on how Texaco Car Oil 1960 HD and unmatched service can mean fewer hot boxes for your road, call the nearest Texaco Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta. Or write:

Texaco Inc., *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.

Tune In: Texaco Huntley-Brinkley Report, Mon. Through Fri.-NBC-TV

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Mechanical Division Meets June 28

When AAR Mechanical Division Chairman J. W. Hawthorne calls the Division's "limited" annual meeting to order on June 28, the group can look back on a year when there were numerous organizational changes and when its technical committees were called upon to meet many new problems posed by the rapidly changing railroad situation.

For the first time since 1954, the meeting will not be open to all railroad officers and supply representatives. This is in compliance with last October's request by AAR President D. P. Loomis urging all divisions, for economy reasons, to eliminate such sessions during 1961.

While the regular open meeting will not be held, the letter ballot to be mailed to all member roads within two months after the sessions on June 28 and 29 will again give evidence of the large volume of work which is carried on by the Division. The letter ballots will contain the usual number of propositions for changing existing, or adopting, new standards, alternate standards, and recommended practices. Subsequent adoption or rejection will be made in the regular way, with all roads casting letter ballots.

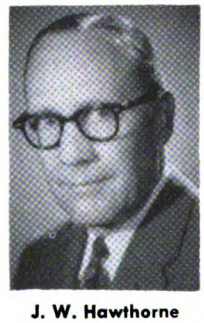
Typical of the Division's activities during the past year have been the adoption of a Code of Interchange for TOFC trailers and containers, acceptance of new car designs for interchange, and actions to eliminate loose packing from all journal boxes. Work at the AAR Research Laboratory in Chicago aimed at solving complex rolling-stock problems, has continued (RL&C, March 1961, p 21).

Consolidation of several committees and assumption of the jurisdiction over rolling-stock details formerly exercised by the now abandoned AAR Electrical Section have taken place during the year. Today's Mechanical Division has the following committees: Nominating, Arbitration, Sub-Arbitration, Prices for Labor and Materials, Sub-Price, Freight and Passenger Car Construction, Brakes and Brake Equipment, Couplers and Draft Gears, Loading Rules, Locomotives and Locomotive Fuels and Lubricants, Safety Appliances, Specifications for Materials, Tank Cars, Wheels and Axles, Lubrication of Cars and Locomotives, Journal Roller Bearings, and Electrical Equipment-Rolling Stock.

The July issue of RAILWAY LOCOMOTIVES AND CARS will carry a report of the actions taken at the annual meeting.

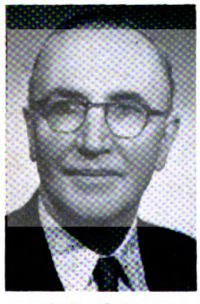
GENERAL COMMITTEE

J. W. Hawthorne (chairman), chief mechanical officer, ACL; T. T. Blickle, general manager, Santa Fe; F. W. Bunce, chief mechanical officer, Milwaukee; L. R. Christy, chief mechanical officer, MP; R. E. Franklin, assistant vice president, Southern; L. E. Gingerich, chief mechanical officer, PRR; J. H. Heron, assistant vice president-equipment, NYC; S. M. Houston, general superintendent mechanical department, SP; E. A. Kuhn, chief mechanical officer, C&O; C. A. Love, assistant chief mechanical officer-equipment, L&N; D. S. Neuhart, general superintendent motive power and machinery, UP; C. E. Pond, general superintendent motive power, N&W; F. B. Rykoskey, chief mechanical officer, B&O; J. A. Welsch, general superintendent motive power, IC; E. Wynne, vice president, CNR.


J. W. Hawthorne


T. T. Blickle


F. W. Bunce


L. R. Christy


R. E. Franklin


L. E. Gingerich


J. H. Heron


S. M. Houston


E. A. Kuhn


C. A. Love


D. S. Neuhart


C. E. Pond

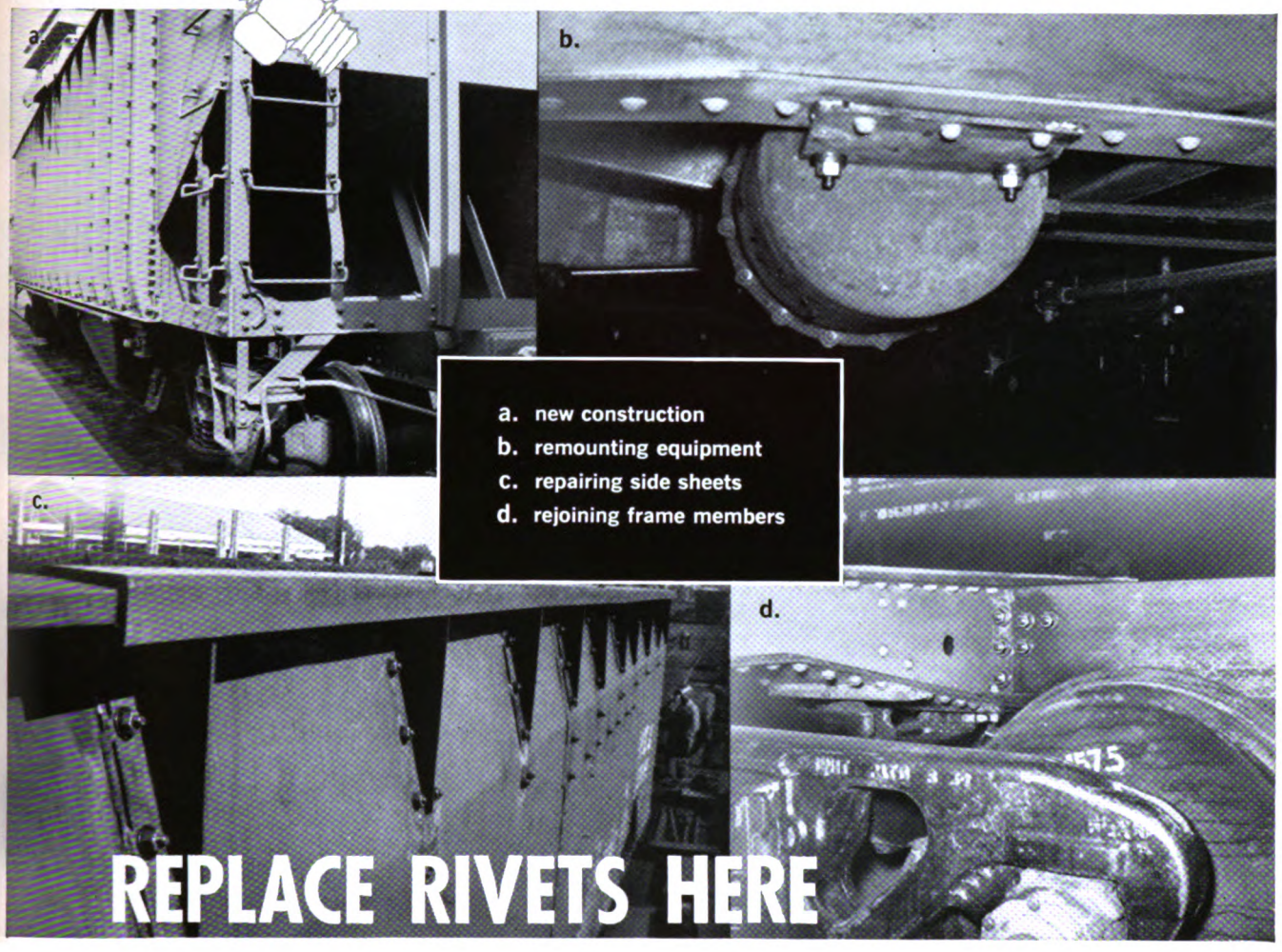

F. B. Rykoskey


J. A. Welsch


E. Wynne

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for faster, stronger construction and repairs

LOOK TO ANY PHASE OF CONSTRUCTION or repair and you'll find a place where RB&W High Strength Bolts are cutting costs for leading roads. For example, bolts are replacing rivets in repairing top chords and side sheets on gondola cars, refastening center and side sills, remounting loose auxiliary equipment such as air reservoirs, tanks and retainer valves.

Reason 1: stronger construction. High strength bolts exert more than *double* the clamping force possible with rivets. Bolted joints *stay* tight.

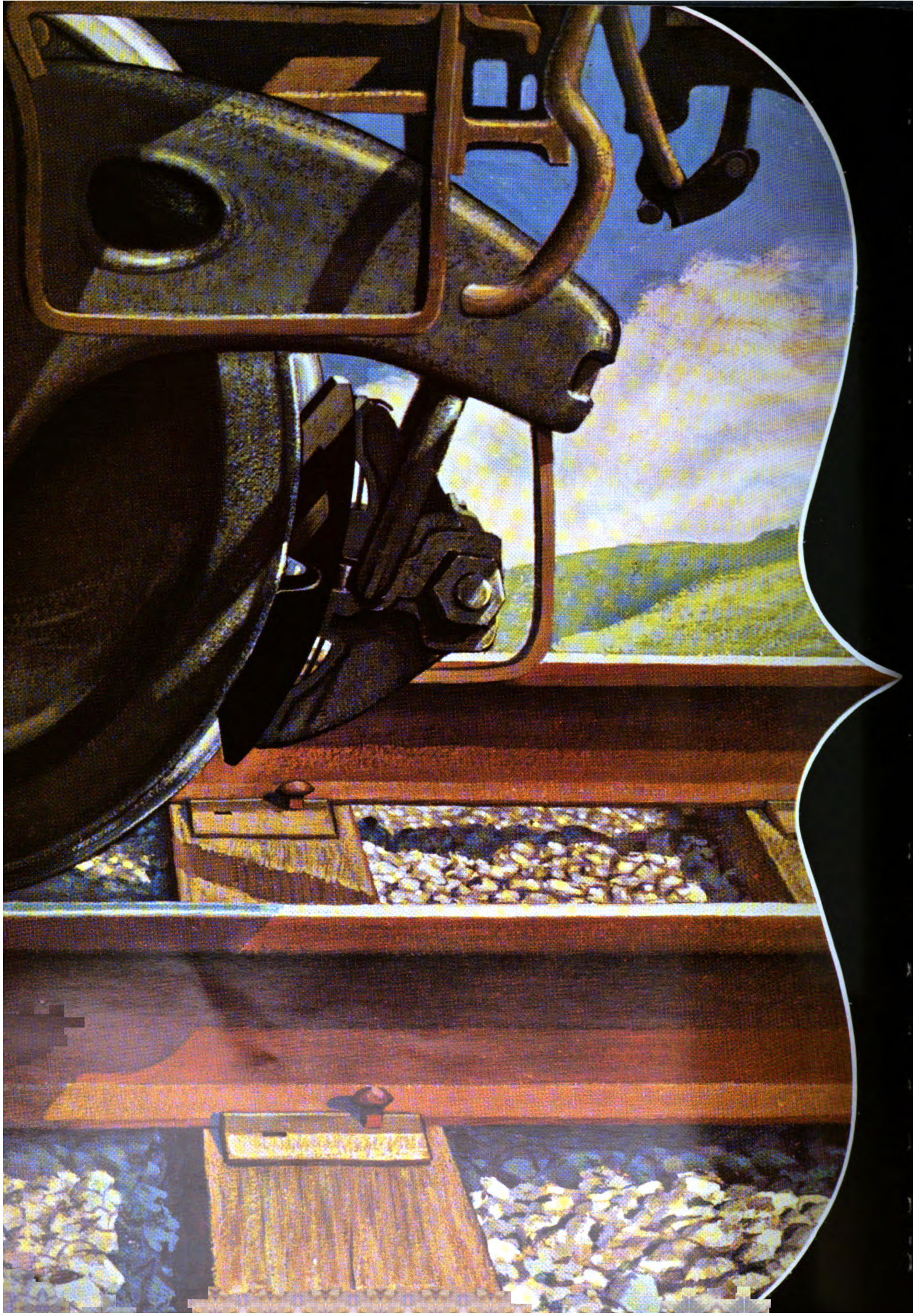
Reason 2: faster construction. In comparative test, a crew used bolts in 69 rivet locations in gondola cars, for a labor saving of $13.78. Though material cost increased $11.40, net saving was $2.38. You'll find that bolt installed cost is consistently less than rivet installed cost.

Reason 3: faster repairs – now, and in the *future*. Picture the time difference between simply unscrewing a nut, and burning out a rivet. When you add up the number of rivets that require replacement in *any* repair job, total time saving is considerable. Bonus: some jobs usually requiring shop attention can be *bolted* right on any repair track. Stock gets back on the road faster.

Road and shop tests by leading roads are proving the superiorities of RB&W High Strength Bolts. An RB&W engineer will be happy to tell you more. Meanwhile, send for Bulletin RR-1, or see catalog 1c/RB&W in the Modern Railroads Catalog file. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.



Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.



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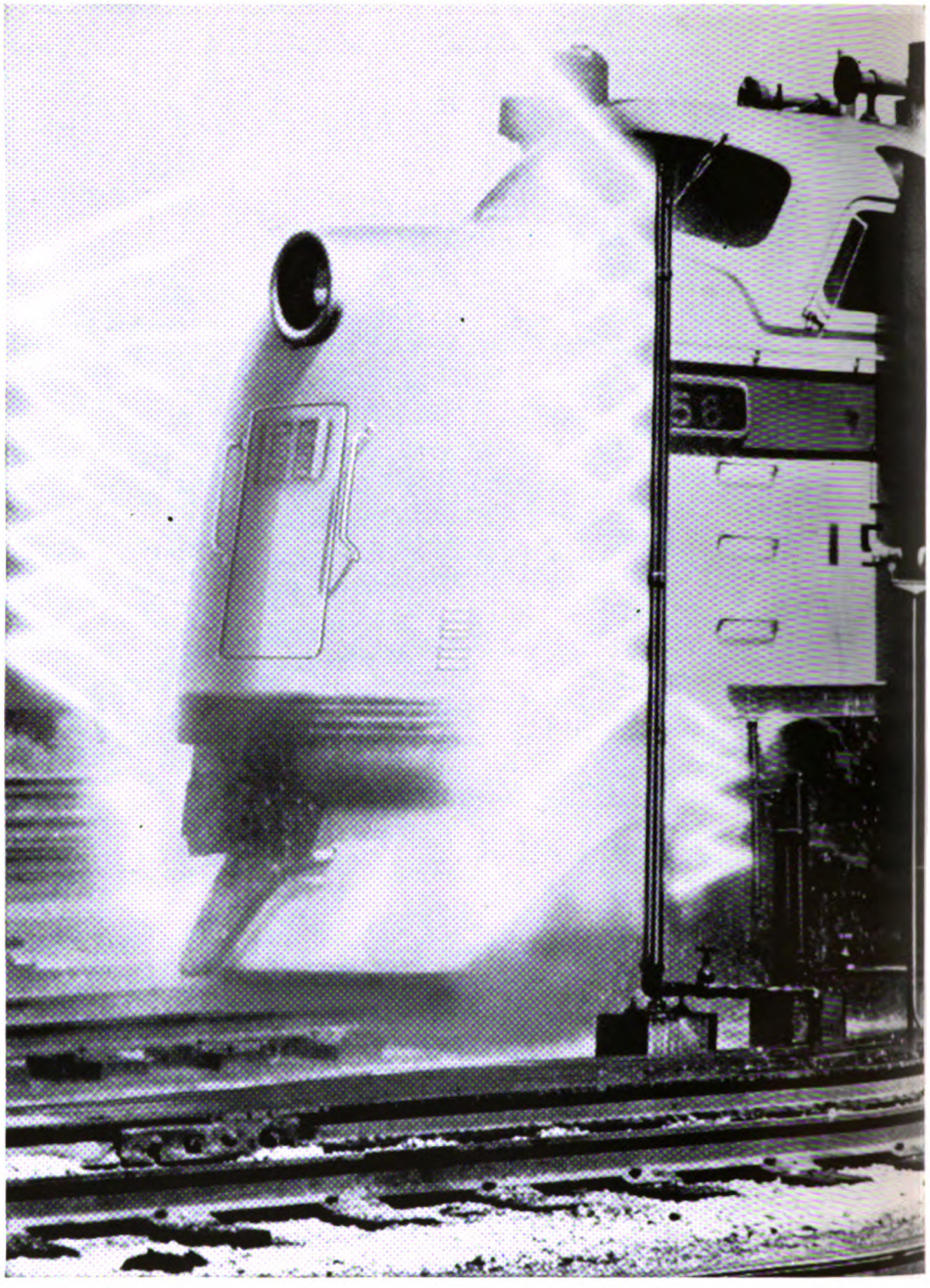
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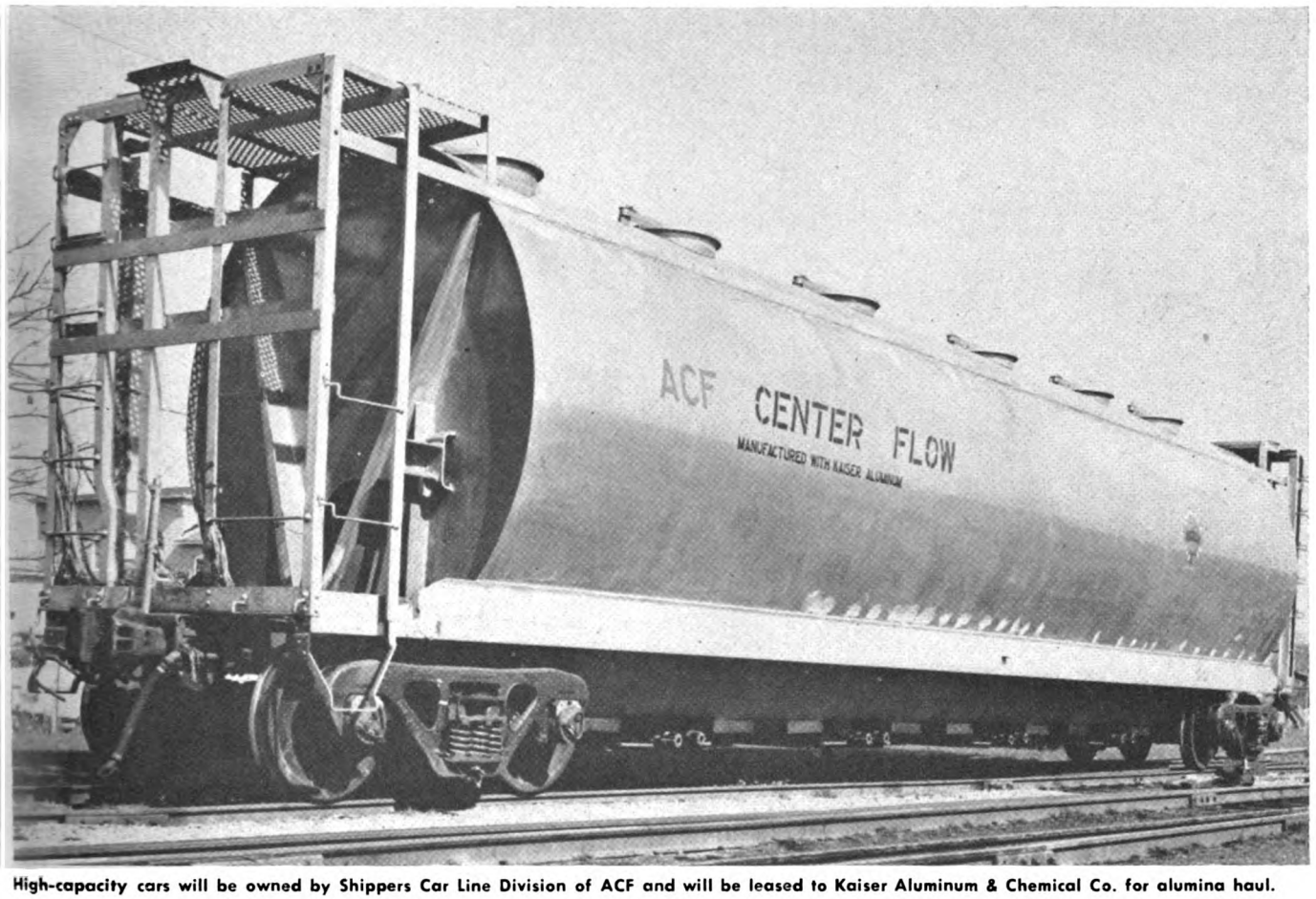


This totally new product from Wyandotte, for diesel cleaning, handles locomotive-body and engine-room jobs other cleaners can't touch . . . actually works *better* than ordinary mild-alkaline cleaners at just half the concentration! Other advantages? New 939 has them to spare. It's safe on good paint, pleasant to use, and can be sprayed in engine rooms without harm to workers. Your Wyandotte representative has the product, and full details about how it works. Call him, today.

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J. B. FORD DIVISION

Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California; and Atlanta, Georgia. Offices in principal cities.



High-capacity cars will be owned by Shippers Car Line Division of ACF and will be leased to Kaiser Aluminum & Chemical Co. for alumina haul.

Center Flow Car Built of Aluminum

Tubular design eliminates the center sill and makes possible rapid discharge of the lading

Construction of 60 tubular aluminum covered hoppers will soon begin at the Berwick, Pa., plant of American Car & Foundry, Division of ACF Industries. These cars, to be leased by Kaiser Aluminum & Chemical Co. from ACF's Shippers Car Line Division for movement of alumina, are to be patterned after an ACF-built prototype which has recently been undergoing an intensive series of road and laboratory tests. ACF and Kaiser teamed to design and build a covered hopper which would "weigh less, cost less, and increase the load limit." Result is the Center Flow car having an inverted pear-shaped body and without the conventional center sill.

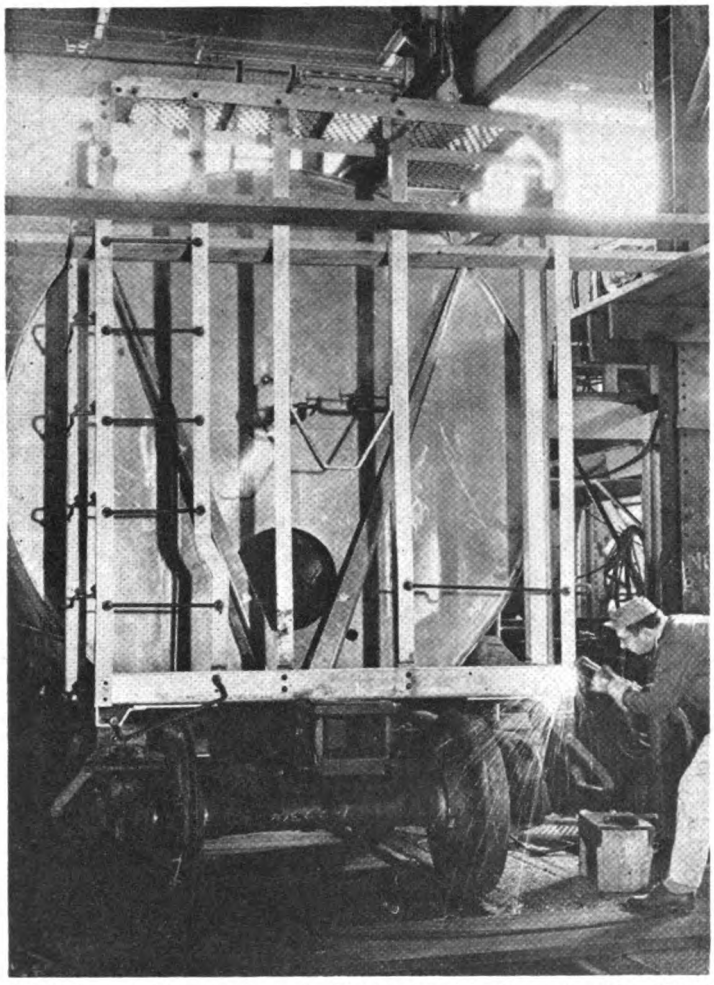
Covered hoppers have recently become the railroad "proving ground" for new materials and new car construction techniques. The latest entry, the ACF-Kaiser design, is a 4,000 cu ft car weighing 43,000 lb and having a load limit of 208,000 lb. The design is the result of Kaiser's investigation of how to utilize aluminum freight cars economically in hauling alumina, the ore from which aluminum is produced. But Kaiser also pointed out that the car is equally adaptable to carrying a wide range of commodities and believes the advantages will appeal to many other shippers.

Other Features

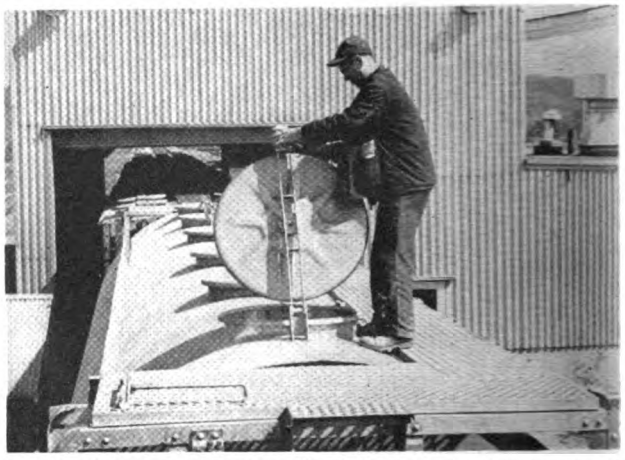
In addition to its low weight, project engineers claim the Center Flow car has other unusual features:

- "Monocoque" design in which the exterior skin or shell takes the load stresses, as is also the case with aircraft structures;
- Inverted pear-shaped body in which there is only single pyramiding of lading so that at least 97% of the body volume can be filled with lading instead of the estimated 93% utilization of conventional covered hoppers;
- Variable length without basic changes in design to meet different cubic capacity requirements;
- Elimination of center sill which makes possible discharge openings on car's longitudinal center line, giving unobstructed discharge and shortened unloading time;
- Lower center of gravity (84 in.) than the conventional rectangular-body car (86 in.).

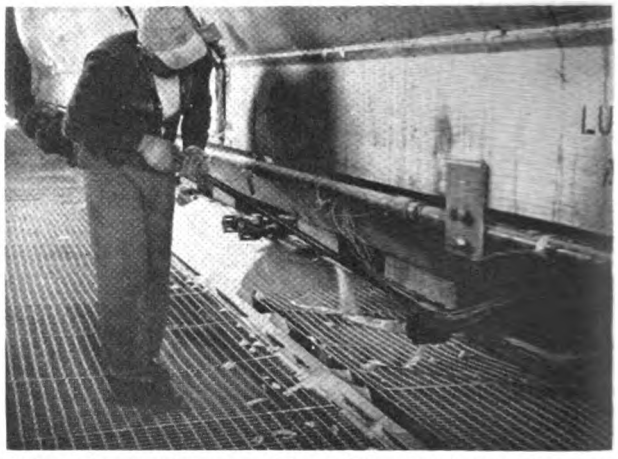
The plus on payload figures to be 28,000 lb compared with a conventional steel covered hopper car of 4,000 cu ft capacity, and 15,000 lb compared with conventional aluminum covered hopper car. Each of these cars has been designed to weigh



Fabrication of the prototype car at ACF Berwick shop was accomplished without difficulty. ACF has built both aluminum freight and passenger cars.



Roof hatches are on center line. Production cars are to be equipped with running boards down each side of car.



With discharge gates open wide, lading was found to flow from car too rapidly for conveyors to remove it.

251,000 lb when fully loaded, the AAR's maximum weight on rail for a car with 6½-in. x 12-in. journals and a pair of four-wheel trucks.

The Center Flow car, weighing only 43,000 lb, has hauled 207,000 lb of alumina in actual service tests. These were made with the prototype car between Gramercy and Baton Rouge, La., and Ravenswood, W. Va., the points between which the 60 cars will run in regular service.

Four Compartments

The Center Flow car interior is divided into four compartments by three bulkheads or partitions which serve two purposes. Structurally, they brace the shell; they also make possible the simultaneous movement of different materials. There are no obstructions in any compartment which impede loading or unloading.

Side and crossridge, and end floor sheets all slope at a 50-deg angle. The roof has six 30-in. diameter loading hatches in a single row on the car's longitudinal center line. The eight discharge openings, also on the center line, are of the conventional 13-in. x 24-in. size. Inside length of the body is 46 ft 6 in. Inside width is 10 ft 2 in., and the outside width, 10 ft 2½ in. Actual cubic capacity is rated at 3,950 cu ft.

Car is constructed basically from Kaiser railroad stock, with some structural members of 6061 alloy. The latter is a widely used construction alloy. The former is a high-strength, weldable alloy developed some years back by Kaiser. It has good physical properties (33,000 psi minimum yield strength); is highly weldable, and has excellent corrosion resistance. About 12,000 lb of plate forms the shell; another 3,000 lb of extrusions is in the four longitudinal sills and framing. Roof, partitions, and sides above lower side sills are ¼-in. plate. Lower portion of the tubular body is $\frac{5}{16}$-in. plate. Lower side sills are 13.5 lb/ft extrusions; upper side sills, 4.5 lb/ft extrusions.

The car is equipped with rubber draft gear. Trucks are A-3 Ride-Control with 2½-in. travel springs, 6½-in. by 12- in. roller bearings, and 36-in. wheels. The car has empty-load brakes. Over strikers, the car's length is 56-ft 6 in. Truck center distance is 46 ft 6 in. and extreme height of the car, 14 ft.

Testing of the prototype car has included static, impact, and road service tests. The car was subjected to 41 impact tests at speeds of 2 to 11 mph. Road tests at speeds up to 60 mph were made on branch-line and main-line tracks of the Pennsylvania with the car empty, partially loaded, and fully loaded. The car was loaded with coal for these tests, because its weight per cubic foot is approximately the same as alumina. Tests were fully instrumented to measure coupler forces, strains, accelerations, and velocities. Instruments included 256 strain gages and 12 accelerometers.

R. Cook, test engineer of ACF's Research Laboratories at the Berwick plant, said, "Tests have verified theoretical assumptions and design parameters." A fatigue test will be completed before the 60 cars go into production in early August.

SAFE WITH SERVOSAFE®

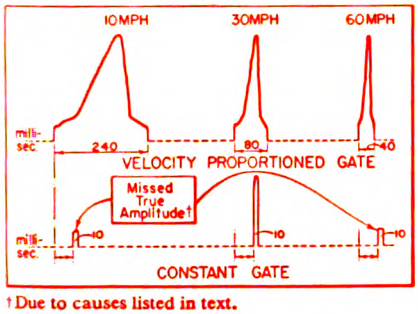


SERVOSAFE® railroad electronic specialist John Sollesnes adjusts set of track transducers—recorder "gate" switches—for Grouping III (automatic alarm with carrier) Hot Box Detective* system on Pennsylvania Railroad main line near Edgewood, Md. Pair of "Servo" infrared trackside scanners is shown just outside rails in this typical installation.—■—Type of gating—interval during which scanner views passing journal box and recorder charts amplitude of heat pulse—is critical. Some other types of detector gating systems may actually miss hot boxes entirely.

'Working' on the railroads

HOW THE HOT BOX NOTES THE GATE

SERVOSAFE® "velocity proportioned gate" system always views same area of journal box—always records comparative heat pulses—regardless of train speed. "Constant gate" systems, on the other hand, view different area of journal box at different train speeds. Diagram, below, shows possible displacement of gate impulse relative to heat impulse due to varying train speeds, lateral movement of wheel flanges, askew trucks, scanner alignment, and rail creepage. Constant gate systems can miss hot boxes completely. SERVOSAFE velocity proportioned gate always records true amplitude regardless of variables.



†Due to causes listed in text.

More than 275 SERVOSAFE® Hot Box Detective* systems now in successful operation on 28 major Class I railroads.

Nothing succeeds so well as success.

Nothing sums up SERVOSAFE® success so well as this popular epigram by Talleyrand. Even veteran railroadmen are often astonished at the rapid acceptance this pioneer infrared hot box detector has gained since November 1952. Its success, of course, lies in the success of the basic SERVOSAFE Hot Box Detective* system itself.

Or, more accurately, in the success of the *six* operational SERVOSAFE systems—more than 275 installations now working successfully on 28 major Class I railroads coast to coast.

Consider 3,000,000 hours of successful and efficient operation over the past four years alone. How many hot boxes have been caught in the nick of time? How many possible disasters have been averted? Twenty-eight railroads can provide the best answer. But what better answer than the fact that they have already ordered additional SERVOSAFE systems for installation early this year!

Be safe with SERVOSAFE. Give your experienced Servo man a call.

FOOTNOTE FACTS:

What is a hot box?—Statistics show that a normal bearing, under equilibrium conditions, will run ±30° F. of the mean operating temperature for all journals on the train. Therefore, a bearing whose running temperature is markedly outside this range must be considered abnormal, and consequently be defined as a "hot box."

When is a hot box?—Many "hot boxes" go undiscovered during winter and show up in summer to produce the peak in set-out statistics. Yet detection of winter abnormalities would save thousands of dollars a year now lost because of irreparable damage to journal assemblies during the course of the cold season.

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Railroad Products Division | SERVOSAFE® HOT BOX DETECTIVE* SYSTEMS
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Everyone Out of Step But Me

By Ken Wright

During the lunch break, several of the fellows were talking "shop." Fred suddenly asked, "Pete, how many mechanical refrigerator cars are in service in the United States?"

"That would be rather hard to say, but I'd guess about 6,000," Pete replied. "There are more going into service all the time. Why did you ask?"

"I was wondering if anything about them would ever be standardized. Every car I get on seems to be slightly different in some way."

"I know what you mean," said Pete, "but when you get right down to it, there is probably a lot more standardization than you realize. If everything were to be standardized now, it could mean there would be no further improvements. Many of these minor differences are really evidences of progress."

During the afternoon, Fred came up to Pete rather triumphantly and said, "If you can spare a minute or two, maybe you can tell me what part of your 'progress' has fouled up this car I'm working on."

"What's your problem?" asked Pete.

"I'm supposed to be preparing this car for loading," Fred explained, "but the temperature isn't coming down; head pressure seems to be too high; and there's almost no air pressure differential across the evaporator coil. When I use the clamp-on ammeter around the evaporator fan leads, it shows the fan is running. The compressor is running and, apparently, is loaded. I'm stymied and don't know which way to go. What am I overlooking?"

"Let's go see," said Pete. "Are you sure that the compressor is really loaded up and that all cylinders are working?"

"Sure, Pete; all of the heads are hot."

By this time they had arrived at the car and Pete climbed into the machinery compartment. Almost immediately he came back out. "All the fans and motors seem to be running backwards," he exclaimed. "You're not moving the air through the car; that's why you are not getting the car cooled."

"Running backwards?" Fred repeated. "How could that be?"

After a moment's thought, Pete answered. "Remember, this equipment is powered by 220-volt, 60-cycle, three-phase circuits. Unless the phasing is standard for the diesel alternators on the cars, for the standby cables, and for the electrical components, motors will not rotate in the right direction. AAR standards say the phasing must be 1-2-3; not 3-2-1. This is one standard which is universally observed, and it is important to you and everyone else."

"You've made your point, but how could the phasing be wrong?"

"I'll have to guess, but I can think of two things that could have happened. The car's diesel-alternator could have been changed recently, and the phase sequence of the power plug might not have been checked. What I think probably has happened is that this car was placed for unloading at some place where the engine was shut down and the cooling equipment was connected to a standby cable. They found all the motors turning the wrong way. What was really wrong was that the phase sequence of the standby plug was improper. However, instead of making any change to the standby cable, the wiring in the car was changed. It was easy. All that was done was to reverse two of the wires from the power plug to the cabinet. When the car's own alternator was again connected, all the fans and motors would be running backwards.

"This results from a universal tendency to feel that the other fellow's equipment must be at fault; that yours could never be. Sort of the 'everyone's out of step but me' idea."

Pete was about to continue, but was interrupted. "Just a minute, Pete. How could one know whether the phase sequence is proper, except by checking the rotation of the motors?"

"There isn't any way to tell without a phase sequence instrument. We don't have one, because we're not building cars. However, if the cars were built according to AAR standards, then the wires to the power plug should be color coded."

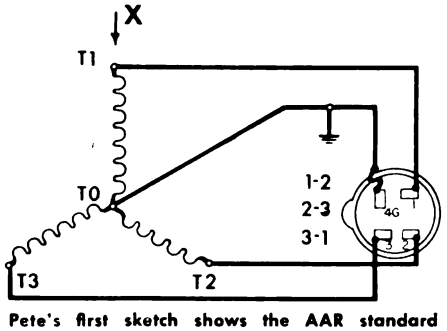
During the discussion the engine had been shut down. Now Fred asked. "Where do you think I should make the change on the wiring and just how do I do it?"

"We'll assume the alternator is probably all right. I doubt that the wiring was changed there, because that would be a tough job. The easiest place to make such a change would be at the control panel. You'll find three cables entering the cabinet from the power plug. Just reverse any two of them. Here, let me make you a sketch of what is involved."

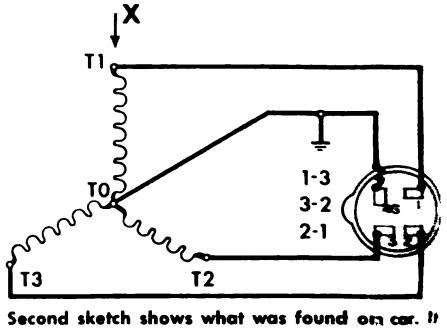
"My sketch is of the alternator, although we are actually going to make our changes at another place. But this is easiest to see. Note that T1 in the alternator is connected to the Contact 1 in the power receptacle. T2 is connected to the Contact 2 and T3 is connected to the Contact 3. Now assume point X is passing T1, T2, and T3 in a counterclockwise direction.

"Maybe, it would be better to say that T1, T2, and T3 do not move, but let's look at it that way. You can see the circuit sequence would be 1-2, then 2-3, then 3-1. We should say Phase 1 leads Phase 2, Phase 2 leads Phase 3. Now suppose we interchange two of the cables going to the power plug, such as 2 and 3."

(Continued on page 51)



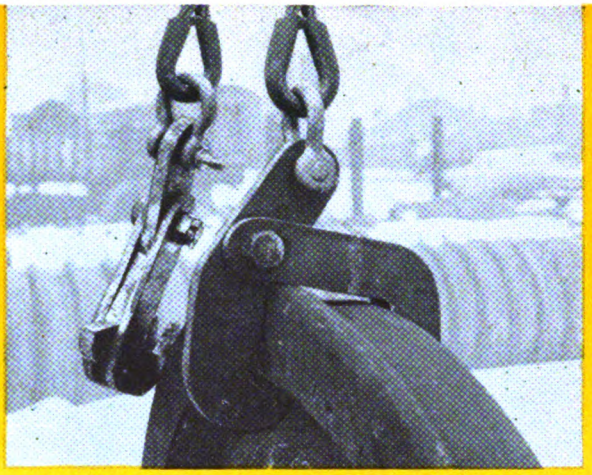
Pete's first sketch shows the AAR standard arrangement for connecting an alternator.



Second sketch shows what was found on car. It resulted from switching two of alternator leads.

This is the seventeenth article in this series, discussing the operation, maintenance and trouble shooting of mechanical refrigerator cars.

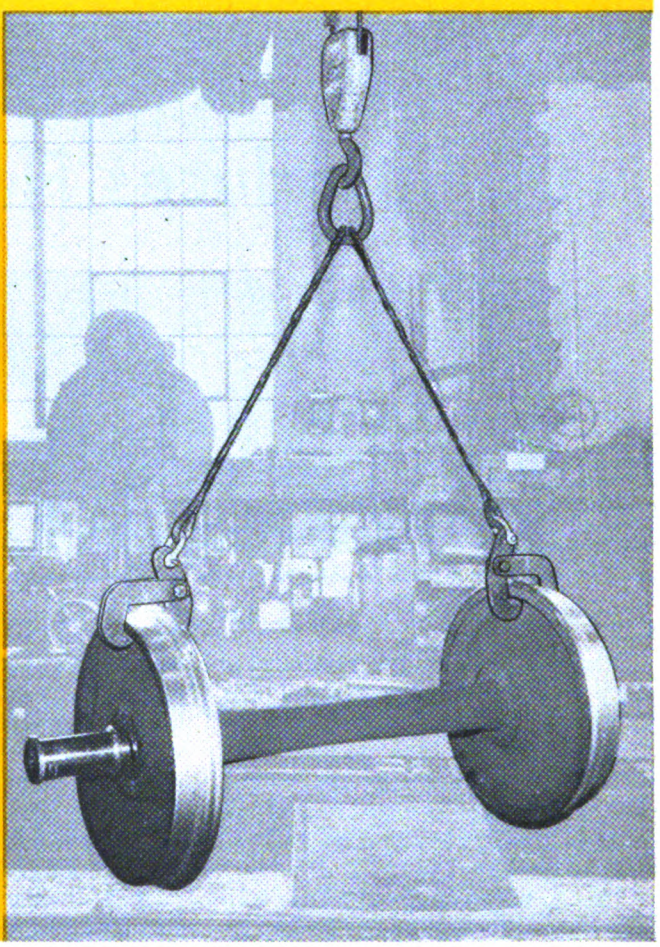
UNIQUE YELLOW STRAND COMBINATION WHEEL SLING MOVES WHEELS OR ASSEMBLIES SWIFTLY, EASILY, SAFELY!



Close-up shows specially designed Yellow Strand hook. It clasps or unclasps easily and cannot slip during lift. Fits all wheels.



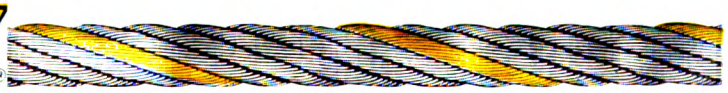
Sling in operation in the yard. Only one wheel is shown, but two are carried as easily. Sling holds wheels straight and true making it easy to slip wheels on axle.



In the wheel shop the Yellow Strand sling lifts wheel assembly with little effort on the part of the worker. Assembly can be maneuvered quickly and easily. Hooks cannot slip.

Here's another example of the kind of service and satisfaction you can expect when you call on the Yellow Strand sling experts for help or advice. Perhaps this sling can help you do a job better or faster. Perhaps your problem needs a different solution. Whatever that problem may be, depend on Yellow Strand Braided Safety Slings to solve it. Call your Yellow Strand man for full information.

Yellow Strand®



BRAIDED SAFETY SLINGS

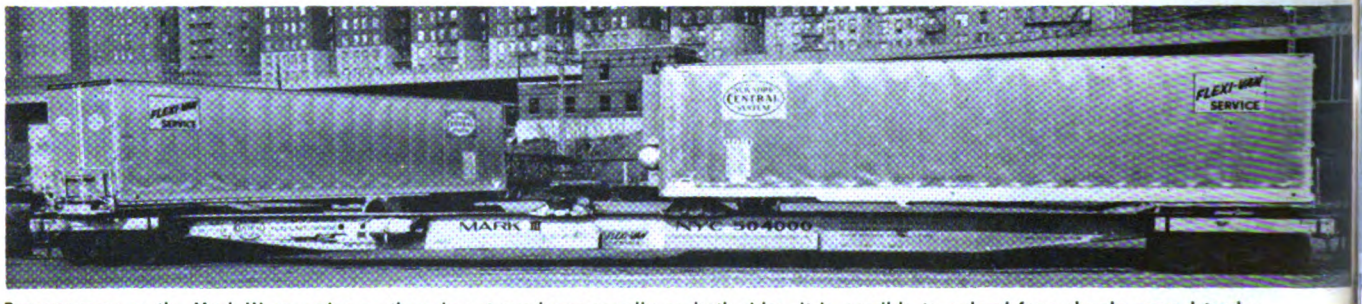
BRODERICK & BASCOM ROPE CO.

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With rear of van locked on turntable, tractor moves around van's end on nose wheel. Nose wheel is retracted and van pushed on to car.

NYC Introduces Flexi-Van Mark III



Because vans on the Mark III car swing so they do not overhang equally on both sides, it is possible to unload from closely spaced tracks.

Flexi-Van Mark III, a refinement of the original container-type piggy-back system introduced by the New York Central in 1958, was demonstrated publicly for the first time last month. The system involves a new type of rail car and a simplified loading and unloading system.

Like most conventional NYC Flexi-Van cars, the 85-ft Mark III car can transport a pair of the 40-ft Flexi-Van wheelless trailer bodies. The conventional car has a pair of turntables, each of which supports one of the 40-ft containers at the container's center (RL&C, May 1958, p 39).

Turntables directly over the two truck centers on the Mark III car carry only the rear ends of the two containers, while their front ends are supported on two kingpin receivers adjacent to the car's center.

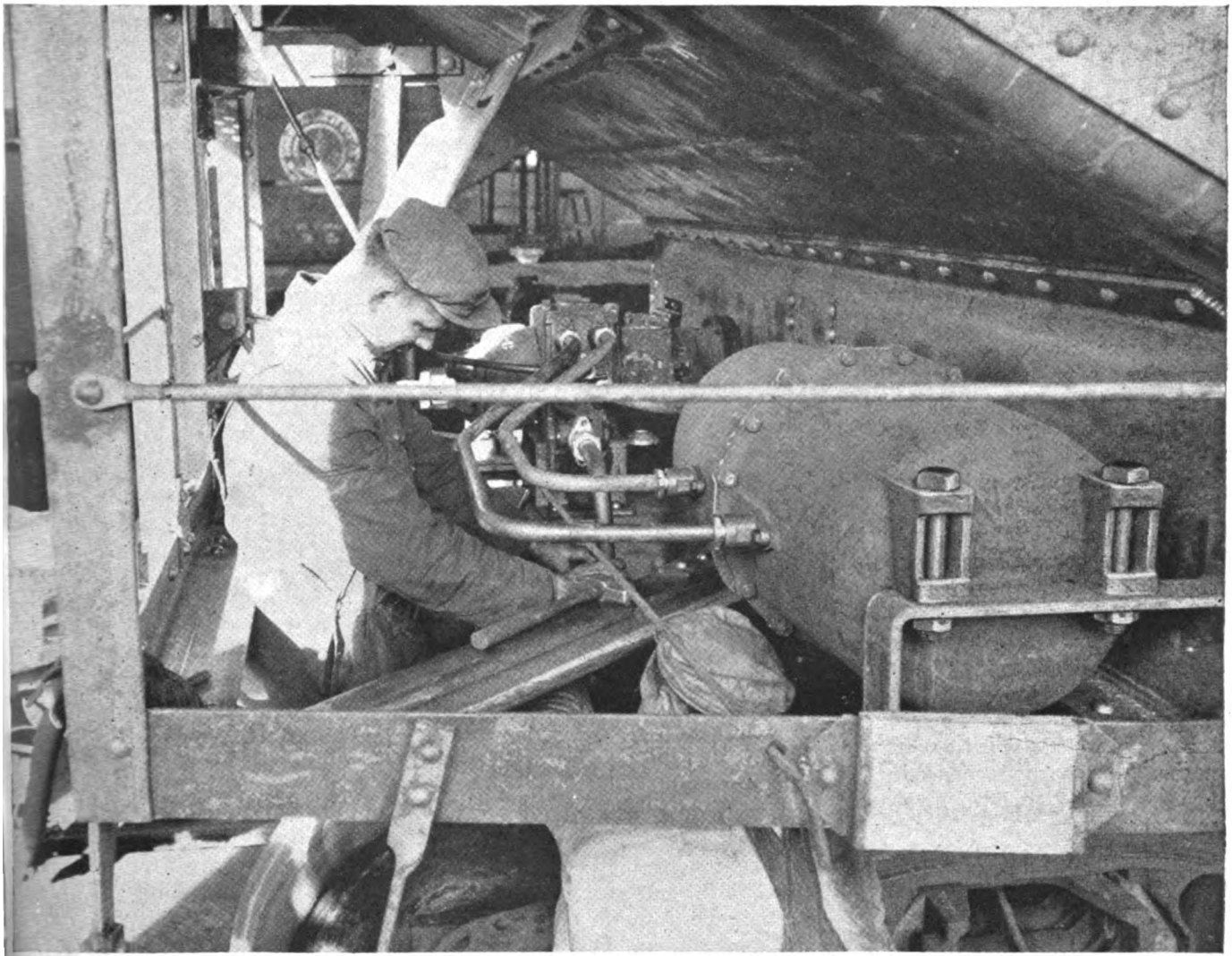
A weight saving of about 5 tons results from the lighter underframe. The weight of the containers is no longer carried into the underframe between the trucks and the hydraulic lifts necessary in turntables on the conventional cars have been eliminated.

Sloped ends of the tracks on the turntables, into which the container's side angles slide during loading of the Mark III car, elevate the container to clear the highway bogie and make a hydraulic lifting system unnecessary. Containers ride about 10 in. higher than on the conventional Flexi-Van car, but the car retains its low-clearance and low-center-of-gravity characteristics which are claimed as advantages of the Flexi-Van system.

Along with the conventional turntable cushioning system giving 8 in. longitudinal travel in each direction, the container is carried over 2½-in. travel spring groups under the turntable tracks for vertical and lateral cushioning. The car also has conventional rubber draft gears and roller-bearing trucks. It weighs about 56,000 lb and costs $1,900 less than the conventional model.

The 25 Mark III cars which the NYC is now receiving are being built by Greenville Steel Car and are fitted with Strick Flexi-Van attachments. A Southern Pacific Clejan car, recently fitted with Mark III attachments, is now being tested.

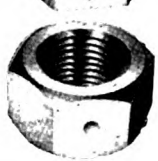
Because the container on a Mark III car is not balanced on the turntable, it cannot be rotated by hand. A special Ottawa Yard Hustler tractor now becomes an essential feature of loading and unloading. This tractor has a powered and telescoping nose wheel so it can move from the front of the trailer to a position at right angles to the front and rotate the van to its rail-haul position. The piston rod of a hydraulic transfer cylinder then shoves the van into its rail-haul position, or hooks to it to move it from this position during unloading.



here are two safe lock nuts for air brake equipment that are also the most economical



The ***M·F Uni-Torque*** lock nut. Prevailing torque lock nut that will withstand terrific vibration and shock loading.



The ***M·F Two-Way*** lock nut. Has the added speed of either-end application, and the *center* lock permits bolt end to be flush with the top of the nut.

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The ***M·F Uni-Torque*** and ***Two-Way*** lock nuts are *all-metal,* deflected thread lock nuts—a locking principle with a successful record of more than 40 years of safe fastening for air brake equipment.

These *proven* lock nuts combine *reliability* with a very substantial savings over the non-metallic type.

Why spend *more* to sacrifice proven protection?

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Slim Solves His 'PC' Troubles

By C. Charles

Slim and Ken, the two road foremen, had not seen each other since their talk with George, the air-brake instructor. Then they had discussed the functions of the P-2 application valve which is a part of the 26-L locomotive air-brake equipment.

Slim told Ken about a difficulty he had encountered on locomotive 4200. "I'm sure, if George hadn't gone over the 26-L with us I would have been in for trouble," Slim said.

Ken was very interested and asked for a more complete description. It seems that the engineman had made an automatic brake application, positioning the brake-valve handle in *Service* position. He then took his foot off the safety control foot pedal. Immediately, there was a blast of air from the foot pedal whistle much greater than normal from the pipes connecting foot pedal valve, P-2 application valve and overspeed magnet valve. This was followed by actuation of the PC switch, which brought all units to idle.

"What would be the normal sequence?" Slim asked, but before Ken could answer, he launched into an explanation.

"When the 26-C automatic brake valve is placed in *Service* position, the control valve is actuated. This operates the J-type relay valve which allows main reservoir air to flow to the brake-cylinder pipe. Air flows to the brake cylinders and through a tee to connection 26 of the P-2 brake application valve, then through passages to the top of the suppression valve, so it is moved to its lower position. In this lower position, the suppression valve prevents the flow of air from the spring chamber above the application valve diaphragm and from the timing reservoir to atmosphere. With the suppression valve in the lower position, the foot pedal can be released without actuating the application valve. Because air was passing into the brake cylinders, the trouble had to be in the P-2 valve.

"The brake cylinder air flowing into connection 26 of the brake application valve is the controlling air," Slim continued. "This air flows to the top of the suppression valve in the P-2 valve. If brake-cylinder air pressure is unable to move the suppression valve down, the safety control foot pedal will not be isolated.

"When the engineman took his foot off the foot pedal, he opened connection 3 of the P-2 valve to atmosphere at the foot valve. With the suppression valve in its upper position, air from the spring chamber above the application diaphragm spool valve and the timing reservoir could flow through connection 3 and the safety controlling pipe to the foot pedal and then to atmosphere.

"Main reservoir air under the application spool-valve diaphragm will overcome the spring pressure above, deflecting the diaphragm upwards and carrying the application spool valve to its upper or *Applied* position. In the *Applied* position, the spool valve connects and disconnects several ports and passages. One of these allows main reservoir air in pipe 30 to be connected through the spool valve to port 5 and to the pipe to the PC switch, thereby initiating a power knockout.

"Why would the brake-cylinder air pressure not be capable of moving the suppression valve to its lower position?" asked Slim.

Ken thought a moment and replied, "There are two possible causes. The '0' ring around the suppression valve piston could be leaking, so it would allow brake-cylinder air to flow to atmosphere through the exhaust port below the piston. If this were the cause, the leak might be great enough to release the brake cylinder pressure. The relay valve might also supply only enough air to keep the brakes applied but not enough to depress the suppression valve. Because no air was passing out of the suppression valve exhaust, I would guess your trouble was due to the suppression valve sticking in the 'up' position."

"Very good," replied Slim. "It so happened we were at the terminal. I had our maintainer replace the application valve portion. After he installed the new portion and cut in the air, he applied the brakes and took his foot off the safety control pedal. This time there was no PC light. We were able to make up time and finally came in right on schedule. On my return the maintainer told me that when he had placed the application portion on the test rack, it would not pass the suppression-valve operating test. When he removed the cover of the suppression valve, he found it to be seized in its upper position.

"I tell you, Ken, you sure have to study these days to keep up with all the new locomotive equipment."

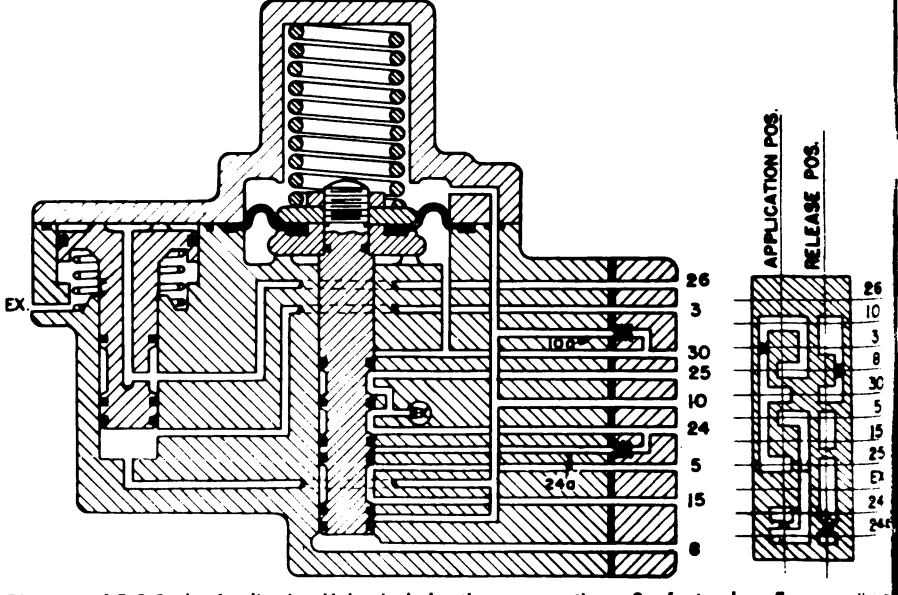
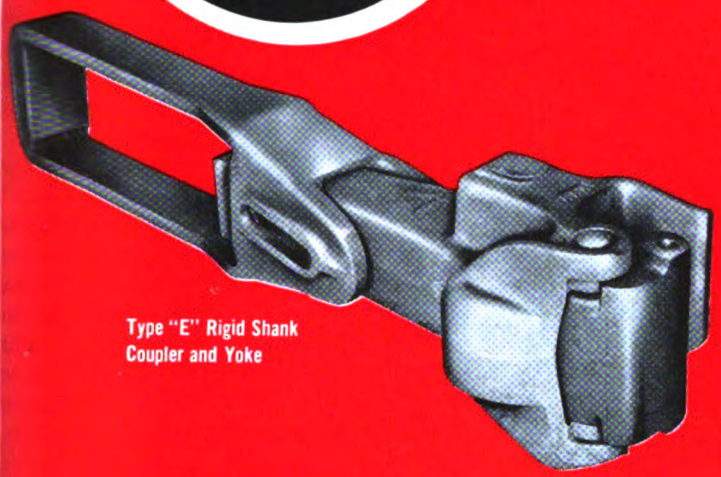


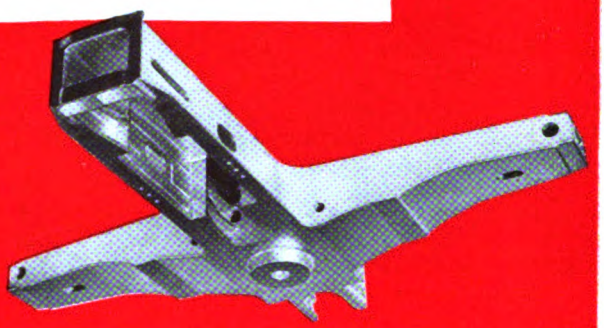
Diagram of P-2 Brake Application Valve includes these connections: 3 - foot valve; 5 - equalizing reservoir; 8 - lock over; 10 - safety control; 15 - equalizing reservoir charging; 25 power knockout; 26 - suppression; 30 - main reservoir; 24 - reduction limiting reservoir.

This is the fifth installment in a series on the 26-L brake. The fourth installment, in two parts, appeared in Dec. 1960, p 30, and Jan. 1961, p 31.

...TRADE MARK OF
DEPENDABILITY SINCE 1902

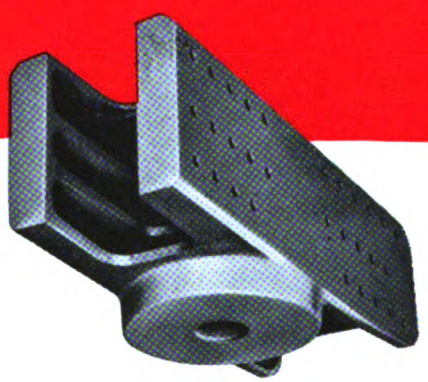


Type "E" Rigid Shank
Coupler and Yoke



One Piece
Underframe End

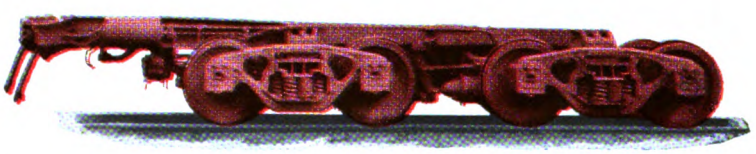
Buckeye Cast Steel COMPONENTS



Bolster Center Filler with
Integral Center Plate

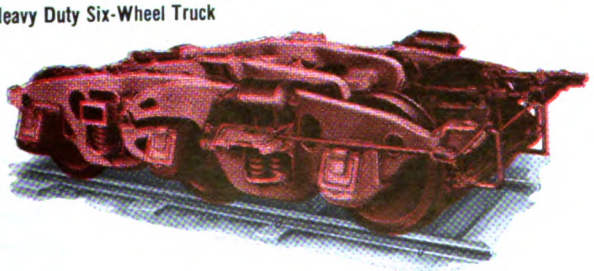


C-R (Cushion-Ride) Truck
with Roller Bearings



Heavy Duty Eight-Wheel Truck

Heavy Duty Six-Wheel Truck



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Aluminum flooring and lining are being installed because of their durability. Holes are being drilled for rivets which secure lining panels.

A&S Rebuilds with Aluminum



Floor panels composed of five "boards" are precut to proper width and clipped to underframe.

A rebuilding program recently undertaken by the Alton & Southern is equipping ten newly acquired box cars with aluminum flooring, lining, doors, and running boards. This is the first time all these products have been used in a single car. Flooring and lining are Alcoa products. Doors were fabricated by Youngstown Steel Door Company from Alcoa aluminum, and running boards and brake steps were fabricated by Morton Manufacturing Company.

This is the first application of the newly developed multi-leg Alcoa aluminum flooring. Each of the aluminum "boards" has an 8-in. top surface width supported by four legs. Edges are designed to provide nailing grooves between the boards. The floor sections consist of five of the 8-in. extruded floor boards welded together and cut to the proper length to fit across the car. These floor panels are installed in the car with steel clips welded to the underframe. A self-sealing filler is applied between the boards to make it possible to nail between them, and the top surface is coated with an anti-skid surfacing material.

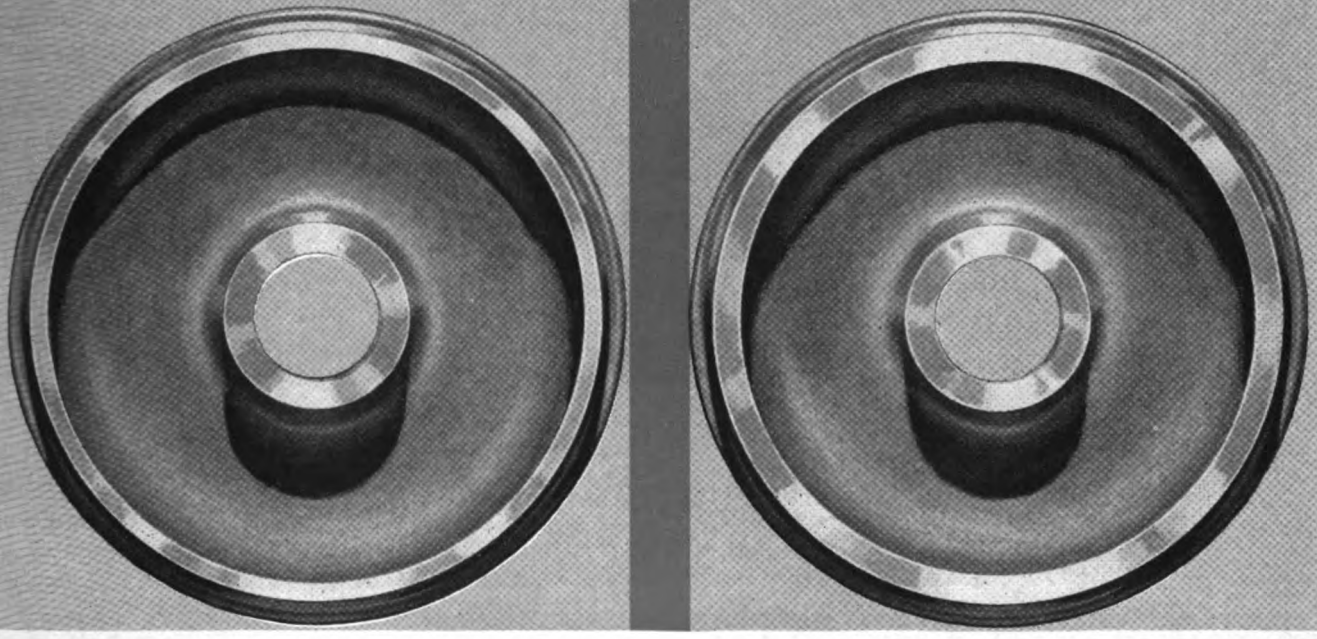
Durability is a prime reason given by the A&S for its use of all the aluminum components involved in the rebuilding of these 40-ft 6-in. box cars. Along with its corrosion resistance and strength, the aluminum floor is estimated to save 1,300 lb in weight as compared with a steel floor. The lining weighs 1,800 lb less than a comparable ¼-in. steel lining, and each door weighs about half as much as a comparable steel door.

During the rebuilding at the A&S East St. Louis, Ill., shop, car doorways were widened from the original 6 ft to 8 ft, making it easier to use lift trucks for loading and unloading. Added stringers were applied before the floor was installed, a new requirement of the AAR Interchange Rules intended to make floors strong enough for today's lift trucks.

Extrusions used for side and end linings are attached to wood furring strips by nailing and to the side and end posts by rivets. The extrusions on the first car extended up 42 in. from the floor, with the remainder of the lining to the ceiling consisting of tongue-and-groove siding. There are 52 lading strap anchors installed in the aluminum and wood siding. Subsequent cars are being lined entirely with aluminum extrusions, or with a combination of aluminum extrusions and plywood.

one of these is a ONE-WEAR WHEEL the other is a TWO-WEAR WHEEL

THEY'RE BOTH CAST BY GRIFFIN



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- Developed to meet the grueling demands of high mileage freight cars
- Special-design parabolic plate distributes stress evenly
- Cast within 20-thousands of an inch tolerances
- Perfectly round as cast . . . no machining required
- Only two tape sizes. (Actually, most Griffin® Wheels are within two half-tape sizes!)
- All present AAR gauges can be used
- Pressure pouring in graphite molds results in superior flange and tread
- Long sweeping fillets under flange and rim give greater strength

HERE'S HOW THEY DIFFER...

GRIFFIN EQS® ONE-WEAR WHEEL

- Minimum 1¼-inch back rim. Can be turned on both flange and tread to restore full contour.



GRIFFIN EQS® TWO-WEAR WHEEL



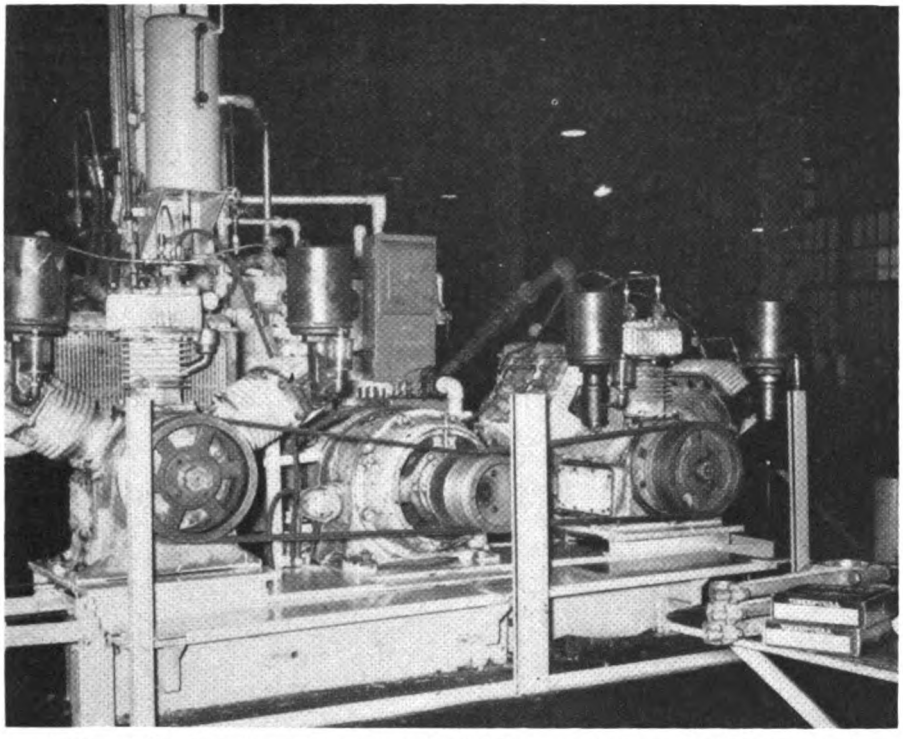
- Minimum two-inch back rim, with one-wear tread and flange design.
- A *multiple-wear* wheel that can be "turned" several times. (You're assured of *at least* two full turns, regardless of flange wear.)

GRIFFIN EQS® ELECTRIC QUALITY STEEL

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GRIFFIN STEEL FOUNDRIES Ltd. St. Hyacinthe, Quebec; Transcona, Manitoba, Canada

Diesel Repair Time Savers

Milwaukee Air-Compressor Test Stand



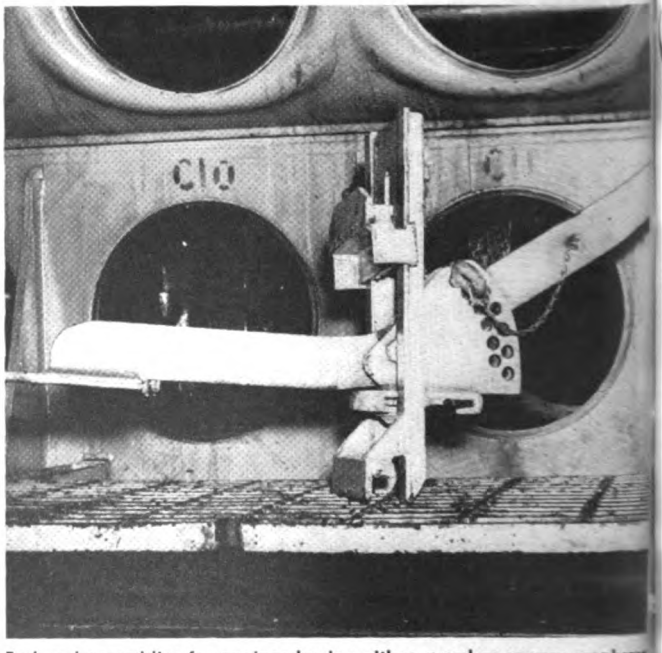
Motor at Milwaukee shop now can be utilized full time because road rebuilt test stand.

The Milwaukee gets full-time performance out of a 50-hp motor operating the air-compressor test stand at its Milwaukee shops. Past practice was to give orifice and break-in tests to one compressor. The motor was loafing on the off cycle. Additional pulleys on the motor's drive shaft and another stand are so arranged that while one compressor is loading, the other is unloading.

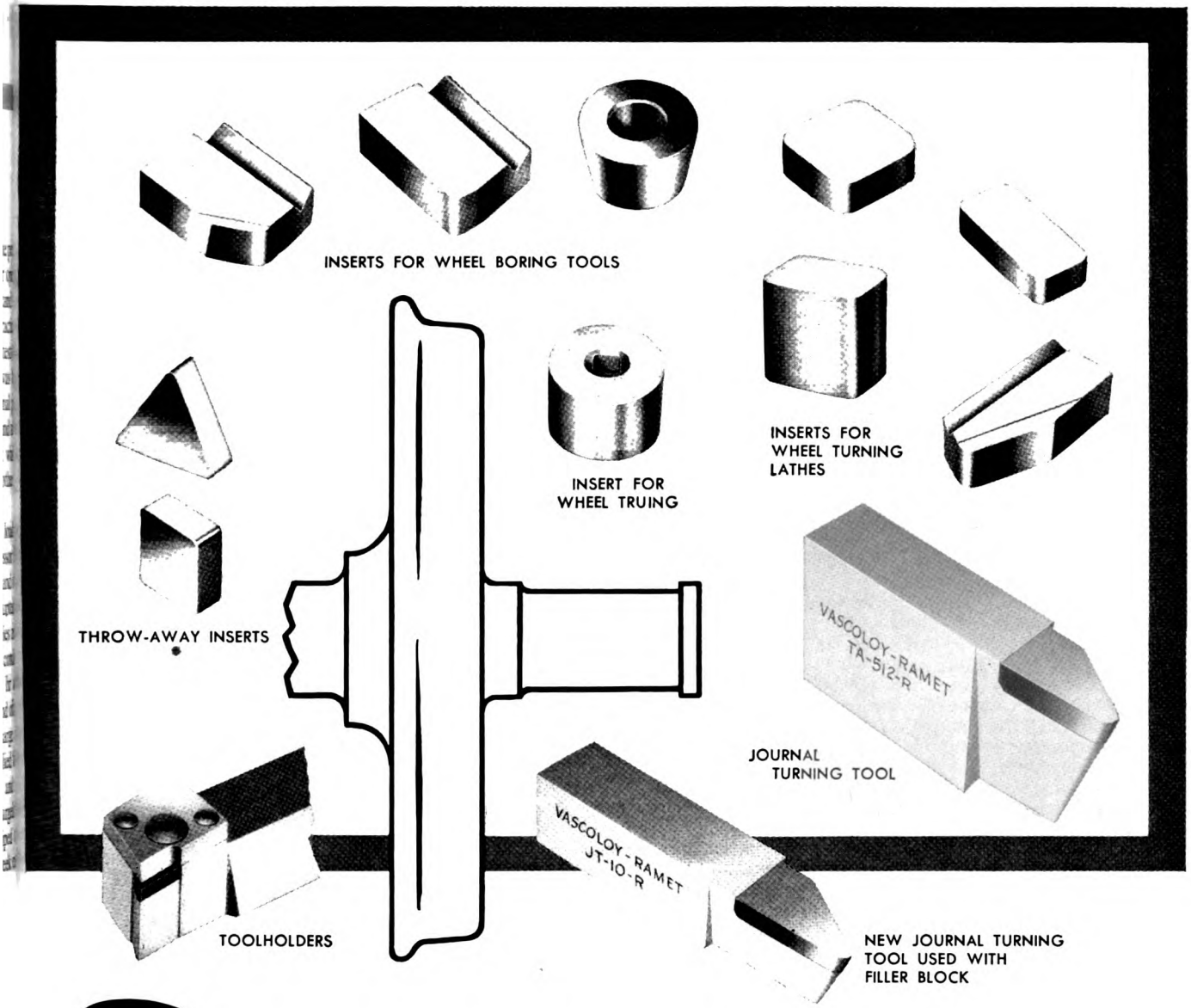
An orifice test under full load is run separately on each compressor for 45 min with equal cycling on and off. In the break-in test, an interrupted cycle controlled by a timer enables rings to be broken in under road conditions. The test requires 6 to 8 hr and is generally on a ½-min on and off cycle. Temperature of the discharge air is taken. An oil gage is applied for the orifice test and break-in, and afterwards removed. Air discharged in the break-in test is usually piped to the shop air line for use on week ends in clean-up operations.

Illinois Central Rod-Assembly Positioner





Fork rod assemblies for engines **having either round or square crankcase** openings can be aligned **without repeated barring at IC shops.** Assembly is of ¼-in. plate **weldments. Handle is adjustable.**



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R-814

(Continued from page 6)

The *Sandersville* has ordered 25 covered hopper cars from Pullman-Standard.

The *Santa Fe* has ordered 50 2,000-hp diesel locomotives as replacements for units acquired almost 20 years ago. Builders not specified.

Trailer Train has completed placement of a $6,700,000 order for 500 piggyback flat cars (RL&C, May, p 36). American Car & Foundry will build 180 cars; Bethlehem Steel, 100; General American, 25; Pullman-Standard, 195, including 90 Lo-Dek cars. All will be roller-bearing equipped.

Union Tank Car has ordered 137 tank cars from its Whiting shops—21 to be 20,000-gal capacity; the remainder, down to 4,000-gal capacity.

AAR Liberalizes Lubricator Core Requirements

Use of polyurethane-core journal lubricating devices will no longer be discouraged by the AAR Mechanical Division. Paragraph (b)5 of Interchange Rule, as eliminated beginning May 1, stated that devices "having core composed largely of polyurethane, must not be used in foreign cars to replace devices having core composed of other core materials having combination of other resilient material, or springs and a limited amount of polyurethane, unless car owner has expressed a preference for such devices . . . Where car owner has not expressed preference for them, no material charge can be made for such lubricating devices applied."

Commenting on this change, the division states "The AAR Research Department is continuing its present investigation of various types of core materials as used in journal lubricating devices, including polyurethane, for the purpose of preparing recommendations containing definite requirements for all such core materials for eventual adoption and inclusion in AAR Specifications for Car Journal Lubricating Devices."

In a separate action, the division reports that conditional approval status has been given to the Absco journal lubricating device produced by the American Brake Shoe Company. This was effective May 1. The Interchange Rules will be amended in the next Supplement to show this device as Conditionally Approved in the table under Interchange Rule 101.

Shop Improvements

The *Baltimore & Ohio* has instituted in its Cumberland, Md., back shop a new "single-track progressive line operation" for the maintenance of diesel locomotives. Initially, the new system was set up for one-trick operation in which six units now pass through the progressive line, resulting in 180 units handled per month.. It is planned, however, to have the system expanded by July 1 to a three-trick operation which will increase monthly production capacity to 540 diesel units. The operation is designed to maintain about half of the road's motive power.

The *Canadian Pacific* plans to spend $289,100 in 1961 for shops and enginehouses, and $202,400 for shop machinery.

The *Northern Pacific* will expend $199,000 for the construction of a car shop and paint shop at Laurel, Mont., to replace shop destroyed by fire.

The *Louisville & Nashville* will modernize its car shops at South Louisville, Ky., at a cost of approximately $4,875,000. Automated wheel-shop equipment will also be installed at South Louisville at an estimated cost of $985,000, and a spot car repair system will be installed at Howell, Ind., at a cost of $134,200.

The *Union Tank Car's* new dome-styled car repair facility at Wood River, Ill., has an enclosed area of 110,000 sq ft, without internal supports, and its height is equivalent to that of a 10-story office building. A similar goedesic structure was completed at Baton Rouge, La., in 1958 (RL&C, Nov. 1958, p 25).

Personal Mention

Alton & Southern.—*East St. Louis, Ill.:* JOHN T. DALEY, superintendent motive power, appointed chief mechanical officer. EWALD MILKERT, assistant to superintendent motive power, appointed assistant chief mechanical officer.

Canadian Pacific.—*Montreal:* HAROLD W. HAYWARD appointed assistant chief of motive power and rolling stock, succeeding W. D. DICKIE (RL&C, May, p 37). MR. HAYWOOD assigned to special duties in connection with MacPherson Royal Commission on Transportation.

Chicago & North Western.— Following master mechanics relieved of Car Department responsibility in their respective territories and jurisdiction changed to cover motive power matters only: A. A. ENDERS, Chicago; H. K. COX, Clinton, Iowa; H. H. MAGILL, Milwaukee; H. R. SPENCER, Green Bay, Wis.; L. N. HASKINS, St. Paul; J. E. BREHM, Minneapolis (Cedar Lake). Following named district general car foreman: D. F. DILGARD, Chicago; W. N. LARSON, Proviso, Ill.; E. S. SPAFFORD, Minneapolis; C. A. STARK, Milwaukee; M. L. SWAIN, Council Bluffs, Iowa.

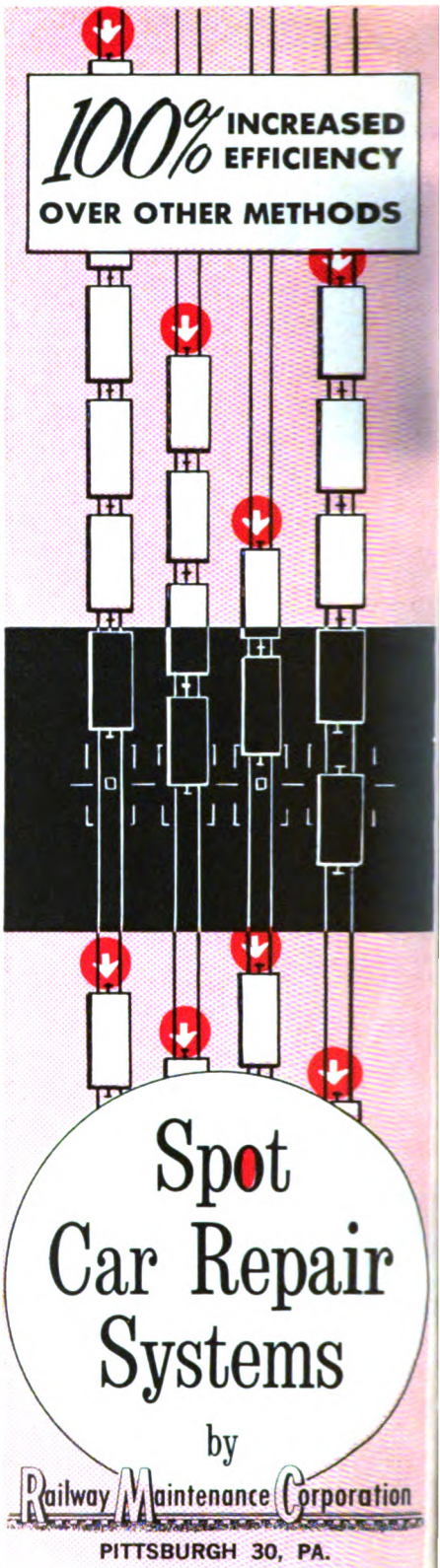
Monon.—*Lafayette, Ind.:* V. C. GOLDEN, assistant general manager and superintendent of motive power, appointed general manager, succeeding T. V. SHERRIER, retired.

New York Central.—*Collinwood, Ohio:* G. L. ZEIDER, superintendent of shop, given jurisdiction over Diesel Record Bureau. This bureau, at Cleveland, formerly headed by A. T. GREEN, retired.

Santa Fe.—*Cleburne, Tex.:* DEWEY J. EVERETT appointed superintendent of shops, with additional title of master mechanic, Northern District, Gulf Lines. *Albuquerque N. M.:* D. L. QUANEY appointed superintendent of shops, succeeding Mr. Everett.

OBITUARY

Lewis S. Billau, retired electrical engineer, Baltimore & Ohio, died suddenly in New York on March 9.



Dramatically increased labor efficiency . . . profits from AAR Billings . . . reduction in per diem costs (bad orders have been reduced from 34 to 12 hours) . . . 50% to 90% savings in switch engine hours! *May we discuss the efficiency of the RMC Spot Car Repair System—involving either separate components or the complete system?*

Supply Trade Notes



Spencer D. Moseley
GATC



S. S. Bruce, Jr.
Air Reduction

GENERAL AMERICAN TRANSPORTATION CORP.—*Spencer D. Moseley,* assistant to the president, elected president, succeeding *T. M. Thompson,* now board chairman and chief executive officer.

■

AIR REDUCTION SALES CO., A DIVISION OF AIR REDUCTION CO.—*S. S. Bruce, Jr.,* appointed manager of national railroad sales department in Pittsburgh, Pa.

■

SERVO CORP. OF AMERICA.—Five railroad district sales and service offices established: *Lennie E. Keeton,* sales engineer, Southeastern territory, Richmond, Va.; *Paul Prosswimmer,* sales engineer, Northeastern district, Hicksville, N. Y.; *Sal Compo,* sales engineer, Western district, Los Angeles; *Sanford Steward,* district manager, Central district, Chicago. Sales engineer for Southwestern district to be appointed.

■

DUFF-NORTON CO.—*J. D. Macklin* appointed sales representative, handling hoist sales in Minnesota, North Dakota, and South Dakota, and jack and hoist sales in Iowa and Nebraska. Headquarters, Minneapolis, Minn.

■

LEWIS BOLT & NUT CO.—Newly formed *Wolfe Equipment Co.,*—Marvin W. Wolfe, president—818 Olive st., St. Louis 1, Mo., appointed central midwestern representative for Sealtite Bolt and Loktite Nut Div. of Lewis Bolt.

■

NALCO CHEMICAL CO.—*Dr. David G. Braithwaite* named president, succeeding *Thomas C. Jones,* now chairman of the board.

■

COLUMBUS McKINNON CORP.—Manufacturing, sales and service branch opened at 955 Indiana st., San Francisco.

■

SYMINGTON WAYNE CORP. — *F. L. Bredimus* appointed vice-president—sales.

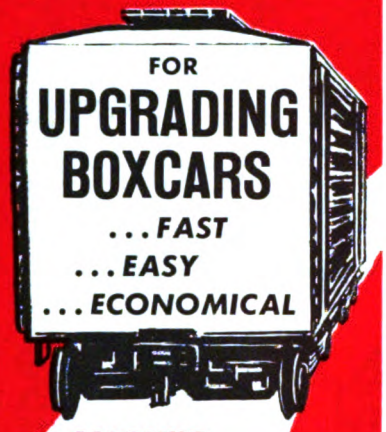
■

GENERAL ELECTRIC CO. — *Don T. Wonderly* appointed manager of locomotive product service.

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ALUMINUM CO. OF AMERICA.—*D. B. Wood* appointed manager of bearings development.

■

SELLERS INJECTOR CORP. — *O'Brien Steam Specialty Co.*, Syracuse, N.Y., appointed Sellers representative in Central and Eastern New York.

■

GENERAL STEEL INDUSTRIES, Inc.—General Steel Industries new name of former *General Steel Castings Corp.*

■

TOWNSEND CO.—*David J. Belcher* appointed sales representative in Kentucky and Ohio. Headquarters, Cleveland, Ohio.

■

UNION CARBIDE DEVELOPMENT CO., DIVISION OF UNION CARBIDE CORP.—*C. Wayne Covington* appointed manager of sales for ULOK transportation filters, with headquarters in Des Plaines, Ill.

■

JOHNSON RUBBER CO. — Representatives appointed to cover railroad markets: *Fred W. Holstein Co.*, Hopatcong, N. J., VulcBond representative, Eastern United *W. A. Blackford Co.*, San Francisco, Pacific Coast representative; *Western States Supply Co.*, Omaha, Neb., Central-West area.

■

ACF INDUSTRIES, INC. — *James H. Lyon*, senior sales representative, Shippers' Car Line division, appointed manager of district sales at Chicago. *William M. Burris*, sales representative, Houston, Tex., appointed manager of district sales there.

■

PITTSBURGH PLATE GLASS CO.—*Carl H. Luther* appointed district sales manager, fiber glass division, Chicago.

■

ALCO PRODUCTS, INC.—*James L. Layton* appointed regional sales manager, transportation products, in Pacific region. Headquarters, San Francisco, Calif.

■

NATIONAL MALLEABLE & STEEL CASTINGS CO.—Effective July 1, name of company to be changed to *National Castings Co.*

OBITUARY

RAYMOND L. MORRISON, Sr., 64, president of the Morrison Railway Supply Corp., died April 27 in Miami Beach, Fla.

■

WARD N. MESSIMER, 66, retired equipment manager, Merchants Depatch Transportation Corp., died in Chicago on May 10.

Helps from Manufacturers

TESTING EQUIPMENT. 12-page bulletin describes line of ultrasonic testing equipment, portable industrial X-ray, and Magnetic Particle inspection equipment and supplies. (Write: *Sperry Products Co., Division of Howe Sound Co.*, Dept RLC, Danbury, Conn.

HOT OIL SYSTEM HEATER. 8-page Bulletin No. 4023 discusses the advantages of the use of oil instead of water/steam for heat transfer in Vapor's Hi-R-Temp liquid phase heaters. Construction details and complete specifications included. (Write: *Vapor Heating Corp.*, Dept. RLC, 6420 West Howard st., Chicago 48.)

INSTRUMENT APPLICATION MANUAL. Manual D-62, "Methods and Instruments for Maintenance of Generators, Motors, and Power Equipment," describes maintenance and inspection practices to foretell and prevent failure for many different types of electrical industrial equipment. (Write: *Associated Research, Inc.*, Dept. RLC, 3777 W. Belmont ave., Chicago 18.)

HOISTS. 8-page catalog 600 contains specification tables for all Coffing hoist models in lever, power (electric and air) and hand-chain basic industrial hoists, and specification tables for hoist accessories and I-beam trolley attachments. (Write: *Coffing Hoist Div., Duff-Norton Co.*, Dept. RLC, Gateway Four, Pittsburgh 22, Pa.)

AIR FILTERS. Bulletin on oil bath air filters for locomotive air compressors describes operation, construction and design features of heavy-duty air filters designed for use either on Westinghouse or Gardner-Denver locomotive compressors. (Write: *Railroad Sales Dept., Air-Maze Div., Rockwell-Standard*, Dept. RLC, 25000 Miles Road, Cleveland 28.)

CYLINDER AND LINER RECLAMATION. 4-page folder discusses Channelcromium method of reclaiming diesel cylinders and diesel engine liners, including application of controlled surface channels for lubrication. Sequence of major operations illustrated. (Write: *Pennington Channelcromium Co., a division of Electro-Coatings, Inc.*, Dept. RLC, 570 Northwest Highway, Des Plaines, Ill.

DRILLING AND TAPPING. Bulletin 765 describes proper procedures for drilling and tapping aluminum, steel, plastics, etc., to receive Heli-Coil inserts. Discusses tapping problems, their causes, and suggested remedies. (Write: *Heli-Coil Corp.*, Dept. RLC, Danbury, Conn.)

TORQUE-TENSION MANUAL. Manual No. 6101 includes tables listing specific recommended installation torque values for thin and standard height UNC and UNF hex type Elastic Stop nuts. Discusses selection of a tightening torque and effects of use of lubricants. (Write: *Elastic Stop Nut Corp.*, Dept. RLC, 2330 Vauxhall Road, Union, N.J.)

RIVETS. Bulletins TCY-160 and TCL-166 discuss use and advantages of Cherry commercial rivets and blind rivets, respectively. Include charts and specifications for aluminum, mild steel, and monel types. (Write: *Cherry Rivet Div., Townsend Co.*, Box 2157-Z, Santa Ana, Calif.)

HOSE ASSEMBLIES. Reference Bulletin IEB 53 a quick reference guide to Aeroquip hose assembly numbers. Covers various categories of end fittings (J.I.C. and S.A.E. etc.) (Write: *Aeroquip Corp.*, Dept. RLC, Jackson, Mich.)

Letter to the Editor

'Calamity or Opportunity"

To the Editor:

Your editorial, "Calamity or Opportunity," in the February issue of RL&C was read with great interest.

What your editorial disclosed was disappointing to one whose connection with electrical matters on railroads began in the days of the Association of Railway Car Lighting Engineers. In 1910 this group became the Association of Railway Electrical Engineers. The early-day members of these groups had but one purpose in forming such associations. They recognized that no one person, or small group of persons, had a corner on brains or ideas. These pioneers felt that the regular meeting of the members for the exchange of ideas and the pooling of information would benefit all members and the roads they represented.

It had been pretty much an uphill fight, and what your editorial discloses indicates the way is not being smoothed for those who seek to make electrical equipment and devices an efficient aid to all departments.

You state, "It is logical for a man who has come up through the mechanical department to think in terms of things mechanical . . ." As an electrical member of a mechanical department, I know how right you are. Later you say, "Somewhat similarly, electrical men are inclined to tout electrical means and equipment to the exclusion of other means . . ." Human nature being what it is, I can agree with that statement also.

What is needed is an umpire in such matters. The umpire should be someone whose background is neither mechanical nor electrical. As things are now set up, many, or most, electrical supervisors report to a mechanical department head. The chance of electrical recomendations being adopted are largely restricted to the limits of electrical knowledge of the mechanical supervisor. Sometimes it is a case of what a man is not "up" on he is down on.

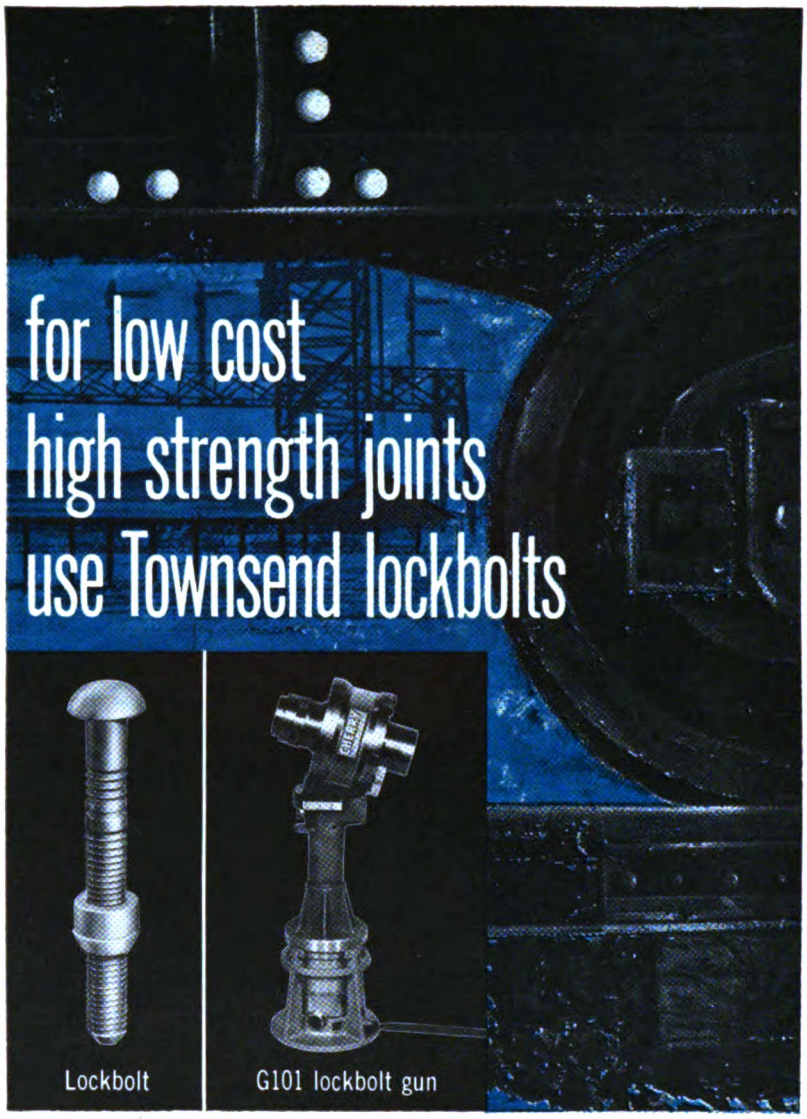
In all fairness, it is like trying to settle the question of "which is the most important leg on a three-legged stool." There can be but one answer; they are of equal importance. Each is necessary to the proper functioning of the organization of which they are a part.

Each department should be given equal opportunity to develop to the end that the contribution of each will bring about the safest, most efficient and economical way to operate a railroad.

It is to be hoped that the AAR Electrical Section, or some equally representative group will be restored to a position from which it may function to its full ability. With one hand tied behind it in the past, it has come up with great things. Free its hands and the railroad industry will be greatly rewarded.

With all good wishes for railroads everywhere.

Guy Franklin



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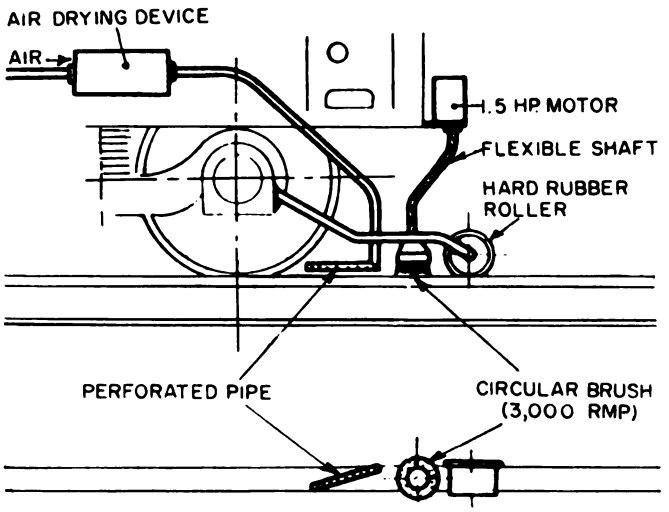
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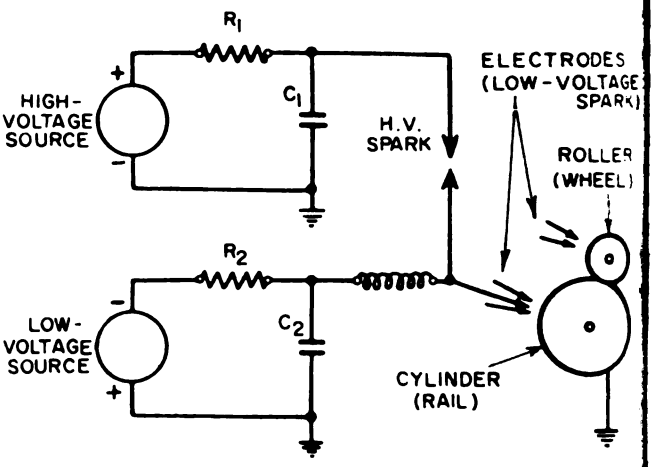
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Mechanical brushing equipment is mounted on a frame which is lowered into its operating position as the locomotive encounters bad rail. Rolling, brushing, and air drying then take place as locomotive advances.



Sparking arrangement, shown schematically, is sequential with initial high-voltage discharge ionizing air gap and high current following. The diagram illustrates the laboratory arrangement which simulated the contact between wheel and rail. French National has now fitted a locomotive with comparable system and is conducting actual road tests.

Could Sparking Improve Adhesion?

French National Railways has made no decision but its work is now at the road-testing stage.

Research aimed at improving the adhesion characteristics of existing locomotives is being conducted by the French National Railways (SNCF—Societe Nationale des Chemins de Fer Francais). While there have been four different approaches to this problem over the past few years, M. Nouvion, chief engineer—electric traction, recently reported that "among the methods for improving wheel-rail adhesion, electric sparking seems to show the greatest promise." During 1961, SNCF locomotive BB 12043 will be operating experimentally with equipment which cleans the driving wheels and rails with electrical discharges. This has just been reported in *Revue Generale des Chemins de Fer,* technical publication of the SNCF.

In its earliest attempt to improve the adhesion characteristics of its locomotives, the French National first tried a series of different materials which were thought might prove more effective than sand. After extensive tests during the summer of 1957, it was concluded that no chemicals gave better results than sand and that in every case the application of chemical to the rail is more complicated than the application of sand.

Next phase of the program was improvements in the locomotive sanding systems. This resulted in the development of special nozzles to direct the sand stream more effectively into the contact area between the wheel and rail. This more efficient delivery, it was reported, made it possible to reduce the quantity of sand used and to eliminate some of the signal failures which result from excessive sanding. SNCF determined that its improved arrangement was most effective at low speeds and that sanding at high speeds would require extremely high sanding velocities.

Mechanical Cleaning

Mechanical cleaning of the rail ahead of the driving wheels was then investigated. A mechanism to do this would be mounted on a frame ahead of the locomotive truck and would drop into its operating position on the rail and begin to operate when a push button is operated in the cab. It is not intended that this arrangement would be operated continuously; instead, it would be started as the locomotive approached sections of line where wheel slip could be expected. There was no idea that this system would make bad rail into good rail, Mr. Nouvion reported. What was being attempted was to make it possible to operate over very bad rail without stalling.

A flanged, hard-rubber roller mounted on the frame initially passes over the rail, pushing standing moisture from the surface. This is followed by a metallic brush rotating about a vertical axis and driven by a high-speed electric motor. Wire brushing can remove surface contamination. Behind the brush a perforated pipe delivers dry air streams to the rail just ahead of the driving wheels, to remove traces of moisture. Air taken from the locomotive compressor is passed through a tank containing activated alumina which dehydrates the air before it is used to dry the rail. The device would be used at starting and at locomotive speeds up to 12.4 mph. It is reported that an earlier and somewhat less elaborate system installed on a locomotive shows good results.

The electric sparking arrangement, which has been rated "to show the greatest promise," has been subjected to extensive laboratory tests. Actual road tests were scheduled to be started only recently. This arrangement would not only destroy foreign materials which cover the rail surface but would remove gases which are absorbed by the surface metal and are claimed to impair adhesion

The laboratory set-up consisted of a roller simulating the wheel which is mounted on a lever and allowed to roll on a larger roller representing the

rail. This test set-up, made in the SNCF laboratory, reproduces the wheel-rail characteristics with respect to circumference, stress, and contact area. The roller representing the rail is motor driven and can be operated to reproduce speeds from zero to 93.2 mph. The levers make it possible to reproduce typical wheel loads. Coefficient of friction can be read directly.

After testing different arrangements, it was decided to adopt a sequential sparking arrangement in order to reduce the power requirements. An initial high voltage discharge, a "pilot" spark, passed between the electrodes and the "wheel" and "rail" serves to ionize the air in these two gaps. This makes it possible to follow this pilot spark with the discharge from a low voltage source.

Laboratory results have shown that the adhesion obtained between clean metal surfaces, normally 0.4, becomes 1.2 immediately after sparking. In another test, the two cylinders were oiled prior to sparking. The coefficient of between 0.1 and 0.2 was gradually increased with continuous sparking, to 1.2. In a test in which the two cylinders were oiled continuously and the sparking equipment operated steadily, the coefficient quickly stabilized at between 0.6 and 0.7.

All these results were obtained at a simulated speed of just under 2 mph. For higher speeds, the coefficient could not be improved to the same degree with the single electrode. It proved necessary to increase the number of electrodes to produce the high coefficients obtained during the low-speed tests.

After laboratory tests showed that it was possible to obtain a considerable increase in coefficient of adhesion, it was not only necessary to determine if this could be obtained in actual service, but also if rail and wheel wear or erosion might be greatly increased, or if the metal surfaces could be altered so that the wheels or rails could be subject to fatigue failures.

Initial Conclusions

While it was not possible to make final conclusions about this last question from the laboratory tests, some initial conclusions have been made. Thin steel bands were applied to the two cylinders representing the wheel and the rail. After sparking, these were removed and weighed to determine if there had been a loss of metal. They were also examined metallurgically to determine if the metal structure had been altered.

After tests, which corresponded to several thousand passages under the electrodes of the double sparking device, it was found that there had been no real modification of the metal structure. Metallography showed the surface was a thin layer of martensite and that, below this for a depth of 0.02 mm, was an aggregate of martensite, austenite, and pearlite. Microscopic examination of these bands showed that there had been no more tendency for them to develop surface cracks than there had been in bands not subject to sparking. There is apparently very little risk of wheel or rail rupture resulting from the sparking, Mr. Nouvion reports. Not only is the modified zone very thin, but, in the case both of the wheel and the rail, it is under the highest compression and away from the zones of maximum tensile stress.

Erosion and wear of the bands was determined by weighing them after considerable operation under conditions simulating development of maximum tractive effort. An unsparked band was found to lose 0.2 grams and the sparked band 0.3 grams. It was found that different types of electrodes cause some variation in this wear, but that there apparently is little relationship between wear and increased tractive effort. Based on its laboratory results, SNCF estimates that rail wear would be increased by only 20% under locomotives equipped with sparking equipment. Against this could be balanced the stress-relieving effect which sparking might have on the rail. This could mean that the wheels of the cars behind a locomotive equipped with sparking might do less damage to the track than is now the case.

It was concluded that "in practice, the increase in wheel and rail wear should be negligible for some operation." It will take some months to complete the series of tests scheduled on locomotive BB 12043. Several electrodes will be installed to treat the wheel treads and several more to prepare the rails immediately ahead of this driving axle.

Everyone Out of Step

(Continued from page 36)

"With everything else unchanged, the circuit sequence will then be 1-3, then 3-2, then 2-1. Phase 3 leads Phase 2, and Phase 2 leads Phase 1."

"Will the cables leading to the cabinet be marked T1, T2, and T3?" Fred asked.

"They will probably be marked L1, L2, and L3."

Fred got up into the car and shortly leaned out to report, "You were right, Pete. Cable L1 is connected to the terminal marked L2, and Cable L2 is connected to Terminal L1. That will be easy to change."

About this time Big Jim, the boss, walked up and asked what was wrong. It was explained briefly, and puzzled look came over his face. "Say, I wonder if that fits with information I got the other day. You fellows stop at the office."

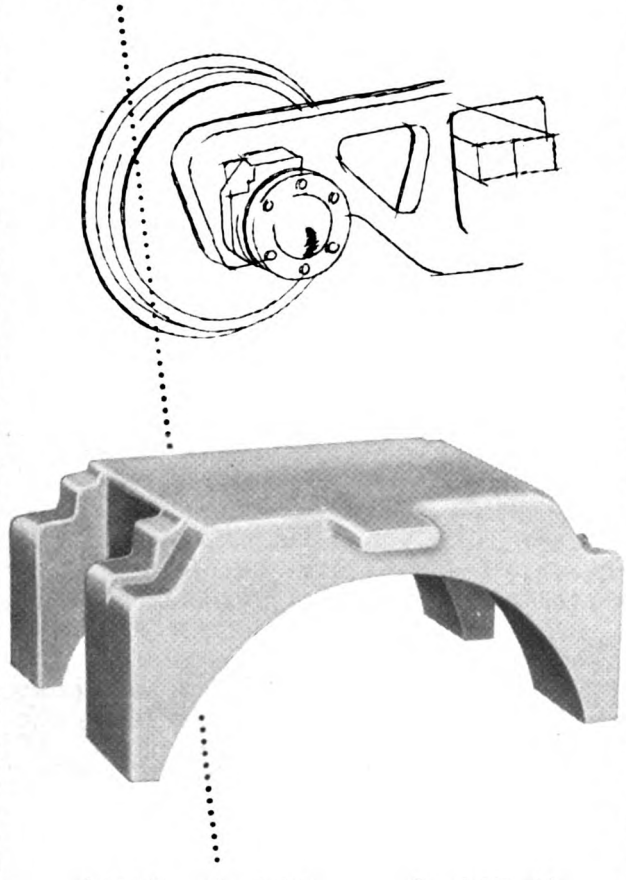
A few minutes later when the two men came into the office, they could report that the car was cooling properly with the fans running in the right direction. Big Jim looked up from his desk. "I made a note the other day. I heard that one rather large group of cars was built with improper phase sequence. They are now being corrected. That could explain why someone's standby cable was wrong. They may have tested it initially on one of the improperly wired cars. This could have led them to the conclusion that the cable was properly wired. When they found a car that wouldn't work properly, then they falsely assumed that the car was improperly wired. Wonder how many cars' wiring they did change?"

Pete turned to Fred. "You see, there is some standardization and it is important. Do you suppose, Jim, that you could contact whoever makes this wiring change and stop him from making any more? It shouldn't be too hard, because we know where the car was last unloaded. That had to be where the wiring was changed, because the car could not have made a successful trip."

"OK, Pete; I'll see what I can do. By the way, by quitting time do you expect to finish that car you are working on?"

"Fred, your idea of a couple of minutes turned out to be a good many minutes. Now I'll really have to throw my feet out," Pete said as he turned and started out the door.

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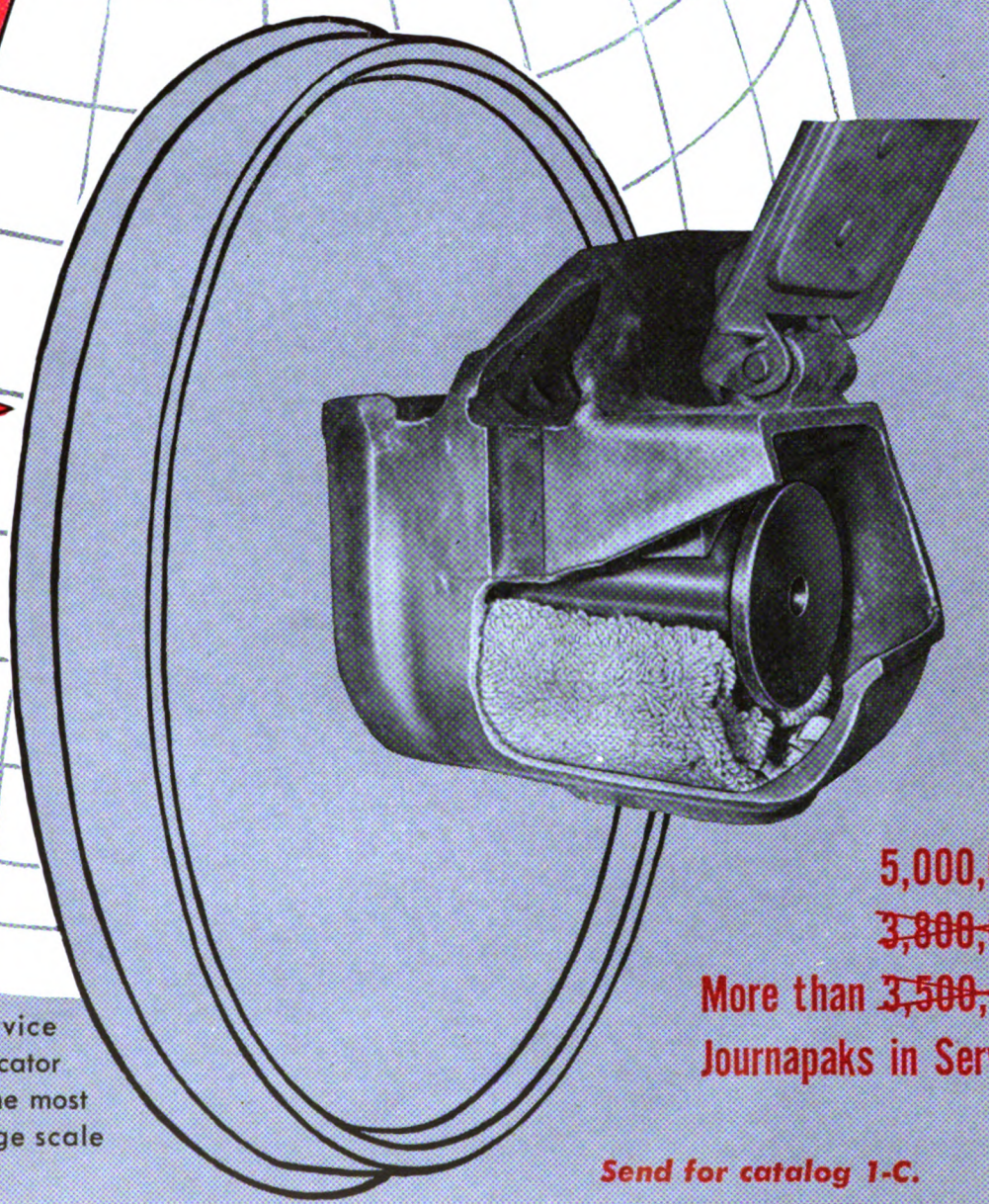
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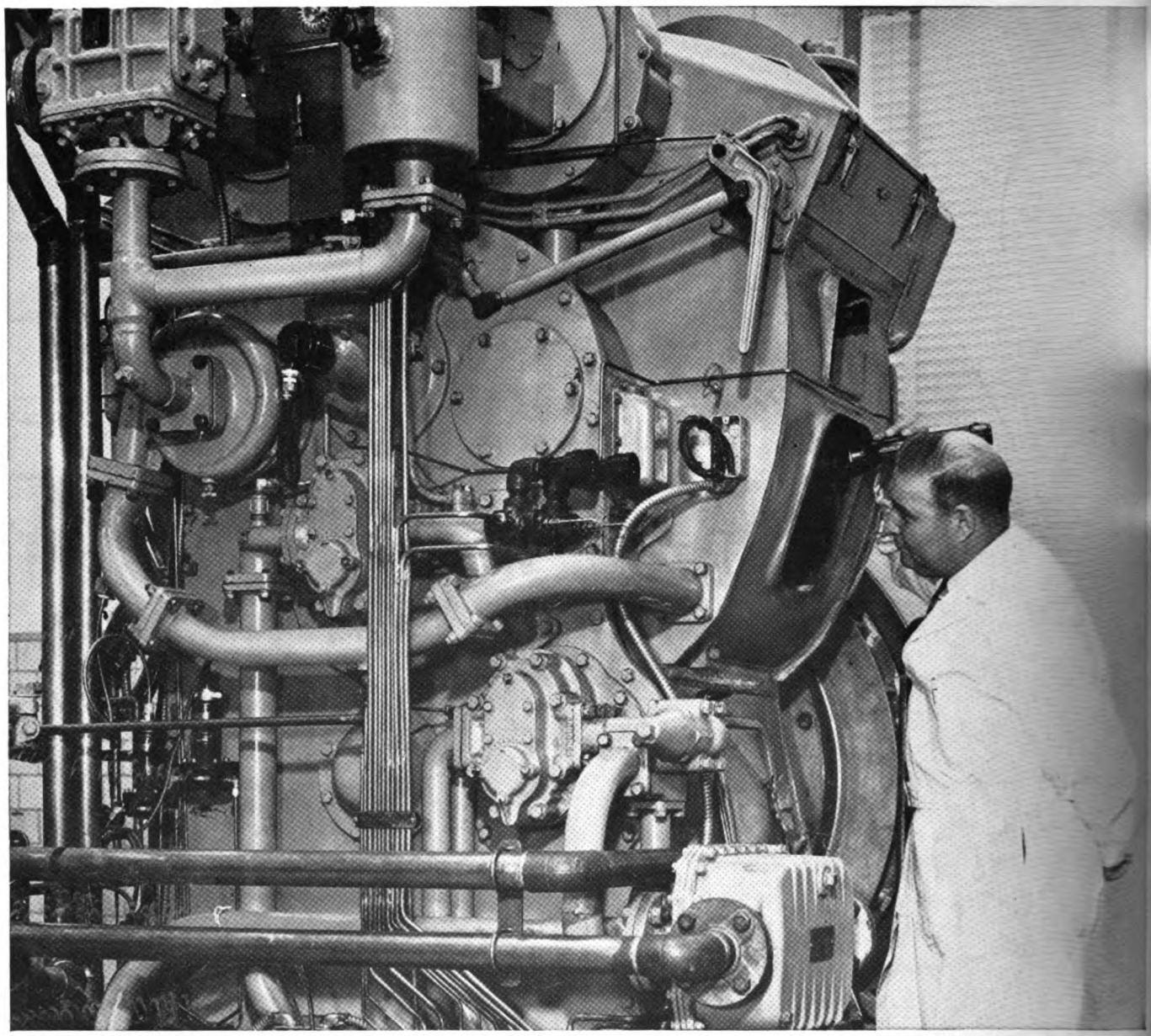
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B&O Diesel Maintenance

page 30

Milwaukee Push-Pull Coaches

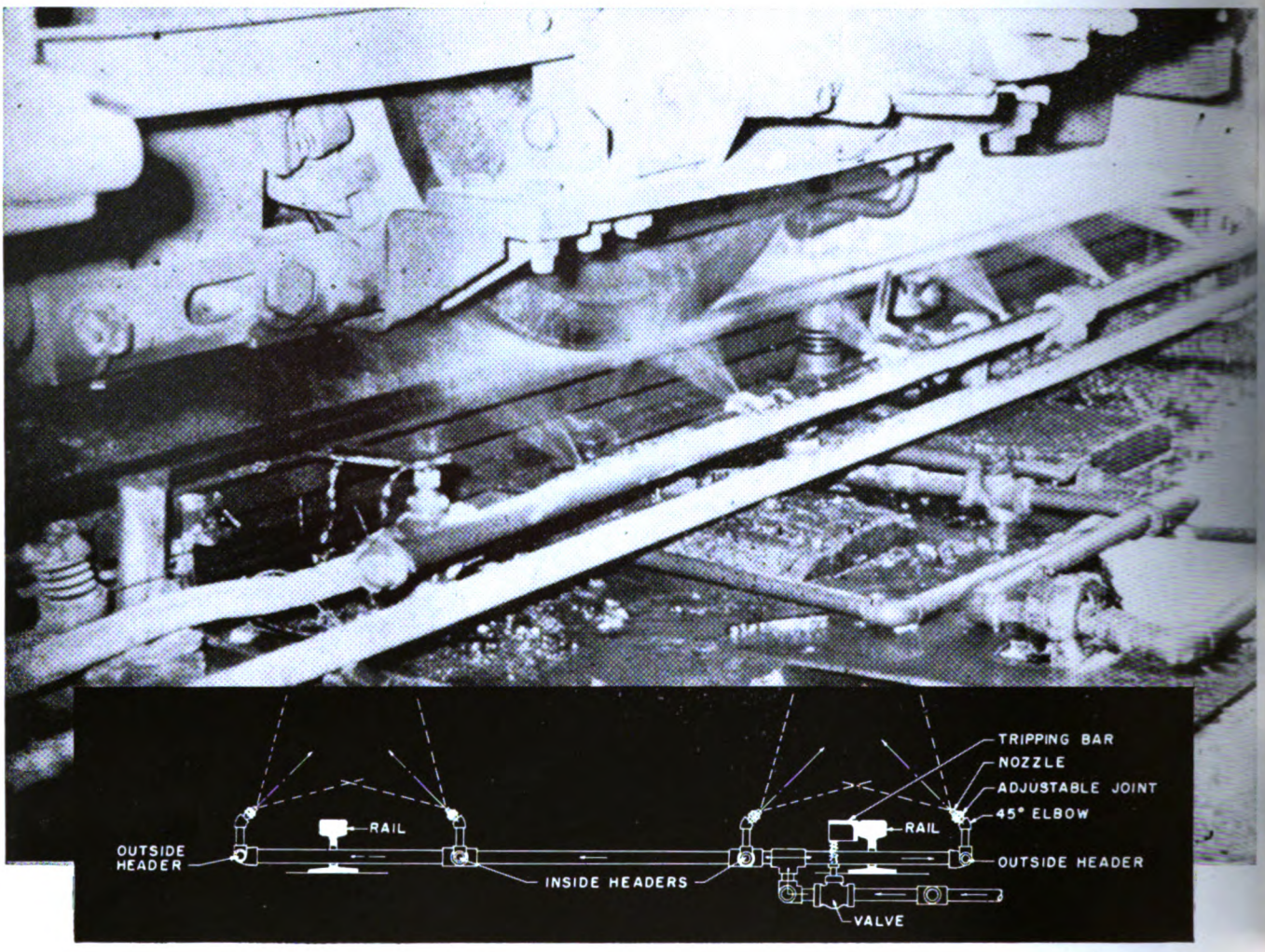
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Actions of Annual AAR Mechanical Division Meeting ... page 23

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...simple setup cleans diesel wheels automatically

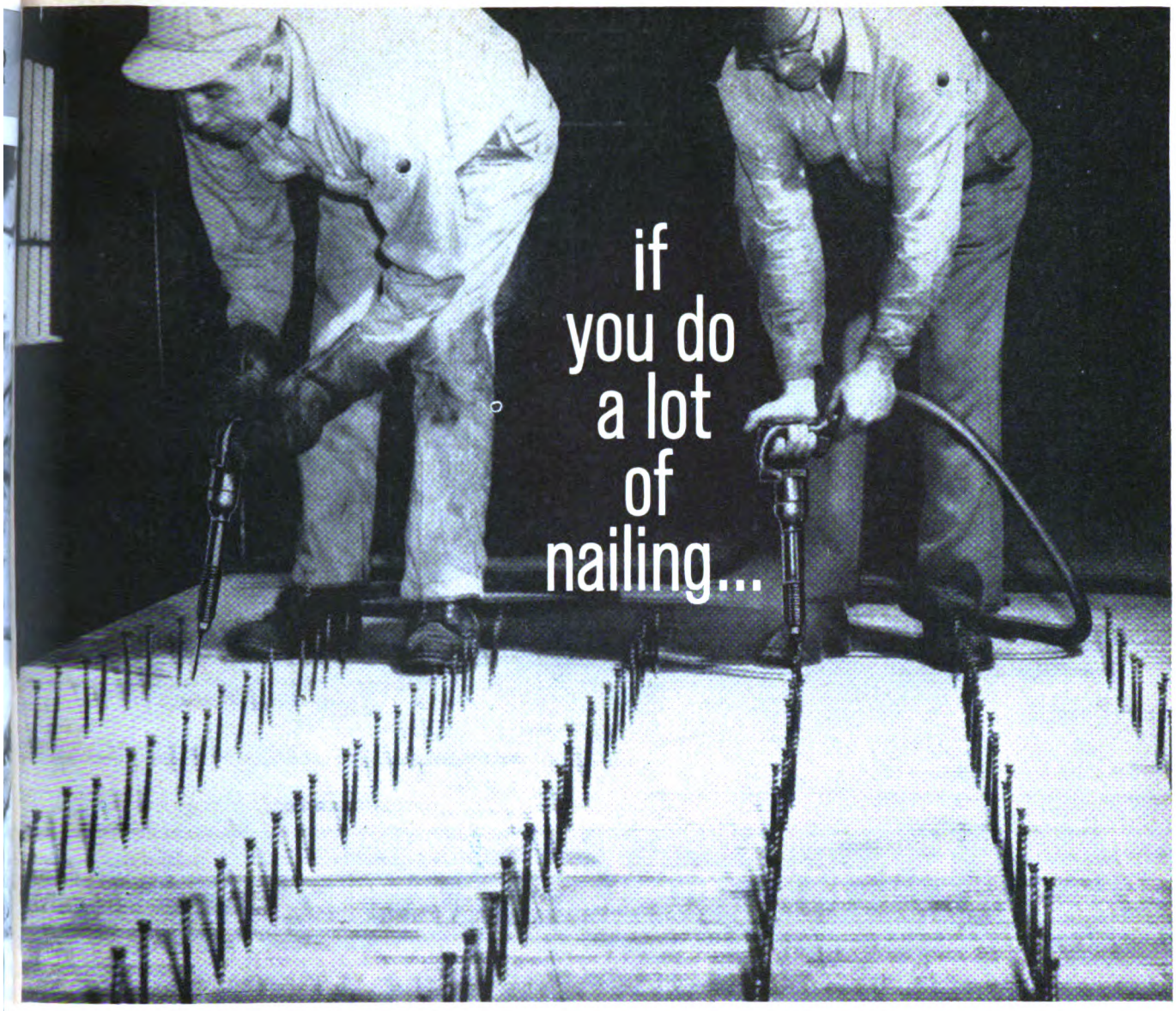
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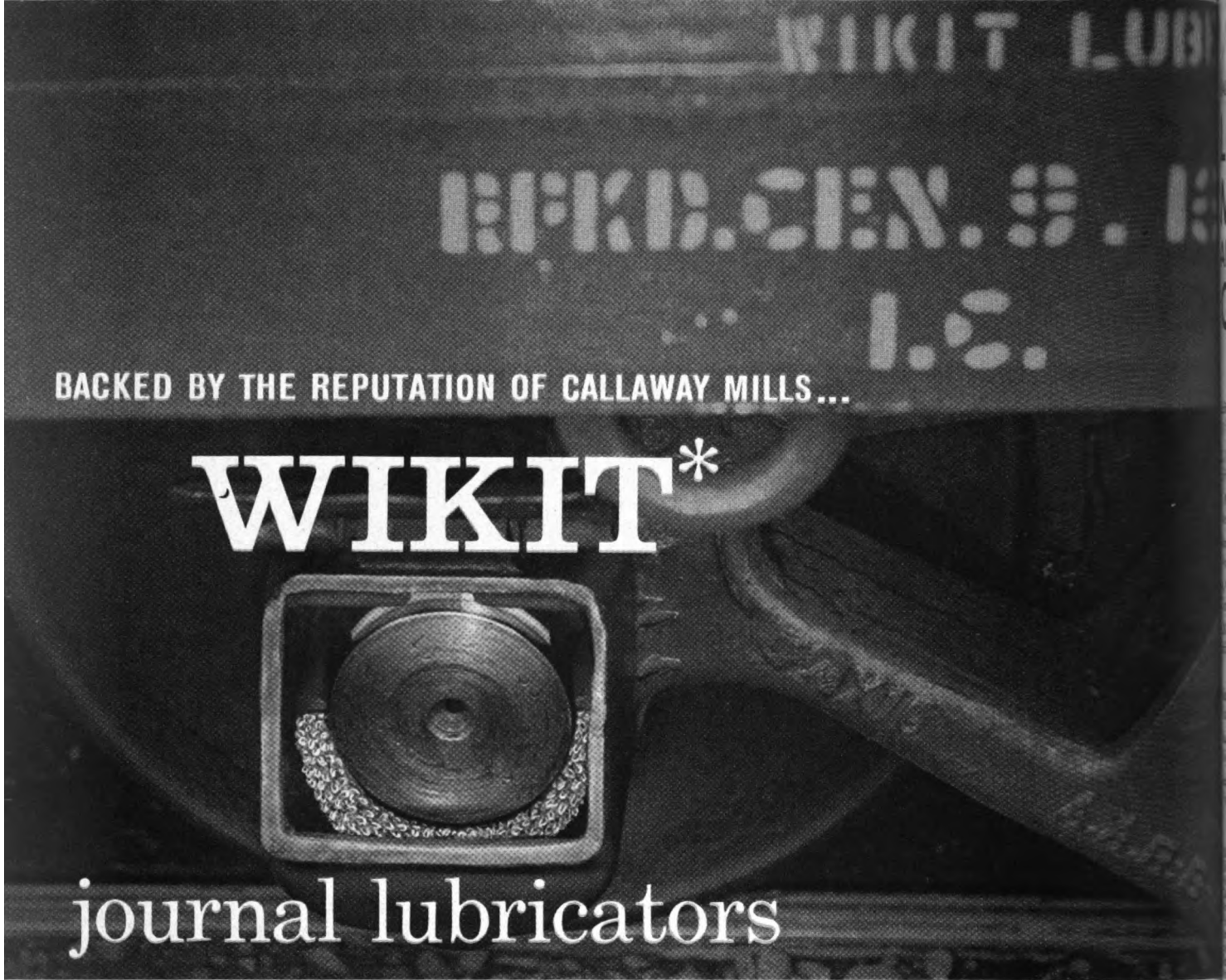
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Economical to use because of WIKIT's moderate initial cost—easy, inexpensive renovation.

Center wick design provides shortest and most direct oil flow to journal. LOOP-TITE* jacket, woven by a special process, has interlocking loop pile with high tensile strength. Over-all design assures rapid, multi-feed wicking throughout lubricator.

ABSORBenized* treatment of jacket provides greatest wicking and absorbency—a special process featured in famous Callaway bath towels.

WIKIT #11 retains 7 pints of oil after saturation and draining 3 hours. Cores are best quality neoprene foam—resistant to oil, moisture, heat, compression set. Strong nylon tape secures nonferrous pull handle. Insert either end first, either side up!

*Registered Trademarks

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RAILWAY
LOCOMOTIVES AND CARS

America's Oldest Trade Paper
July, 1961—Vol. 135, No. 7

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REPORT FOR JULY

Radioactive Tests Solve Diesel Problems

Value of radioactive tracer techniques in analyzing locomotive diesel engine wear was emphasized at the annual meeting of the Society of Automotive Engineers held in St. Louis, Mo., June 5-9. Reports of two separate radioactive piston-ring test programs indicated how effective the method can be in determining the results of using different locomotive fuels, or of installing components not previously tested.

The Southern Pacific, in cooperation with Standard Oil Co. of California and California Research Corporation, has for several years been studying the problems involved in burning residual fuels in locomotives with dual-fuel systems (RL&C, Nov. 1956, p 55).

The test program was conducted in three separate phases. The first phase consisted of short-term radioactive ring wear tests in a standing 16-cylinder EMD 567C engine to evaluate distillate and residual fuels, lubricating oils, operating conditions, engine air filters, and power assembly metallurgy (RL&C, March 1959, p 15; Aug. 1959, p 33).

Phase two involved service tests in 27 EMD 5 567B freight locomotives. The lubricating oil from these "companion" units was periodically transferred to a captive EMD 567C test engine equipped with radioactive rings for wear measurement. In this part of the test the effects of lubricating oil type and lubricating oil filter design were studied both in residual and distillate fuel locomotives.

In the third phase of the program, the important findings of the radioactive ring wear studies were applied to, and evaluated in, Southern Pacific's Roseville, Calif., fleet of residual fuel-burning engines.

Final result of the work has been to save an estimated $400,000 annually on the operation of 167 residual-fuel units. "The operating and mechanical changes made in the residual fuel locomotives were based on more than 200 test runs in the radioactive ring engines," it was reported. "It would have been virtually impossible to obtain by conventional test methods the amount of data required to make the same recommendations on an equally sound technical basis."

The Denver & Rio Grande Western, working with Electro-Motive and Standard Oil Co. of California, sought to determine the effect of several engine design variables upon piston ring wear in a GM Model 16-567C diesel engine. The radioactive tracer technique was employed because of the rapidity with which the effect of each variable could be assessed.

Tests evaluated compression ring wear with the following engine design variables: unit fuel injectors; compression rings; oil control rings.

Tests were conducted with a high quality distillate fuel, and with a mid-continent crude oil.

"On the basis of results obtained from radioactive ring wear tests, it is apparent that the design of the fuel injector, compression ring, and oil control ring, respectively, can influence the wear rate of compression rings," researchers reported. "The effect upon compression ring wear of each of these three design variables is very definitely influenced by the quality of fuel supplied to the engine. In addition, the operating conditions of the diesel engine—that is, speed and brake horsepower—affect the extent to which each variable, including fuel quality, influences compression ring wear.

"Great potential value can be realized from radioactive wear tests of chromium-plated rings because of the possibility of examining the many parameters which simultaneously affect the wear rate of ring face and side."

(Turn to page 10)

TIME SAVING IDEAS FOR JULY

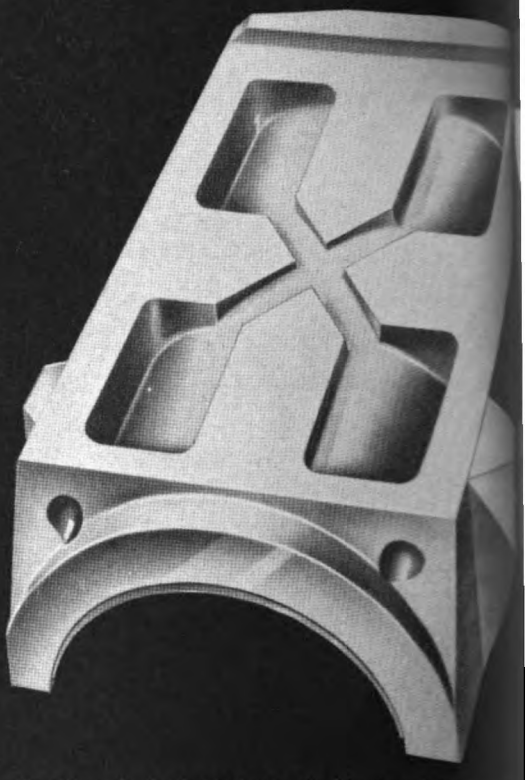
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DEPARTMENTS

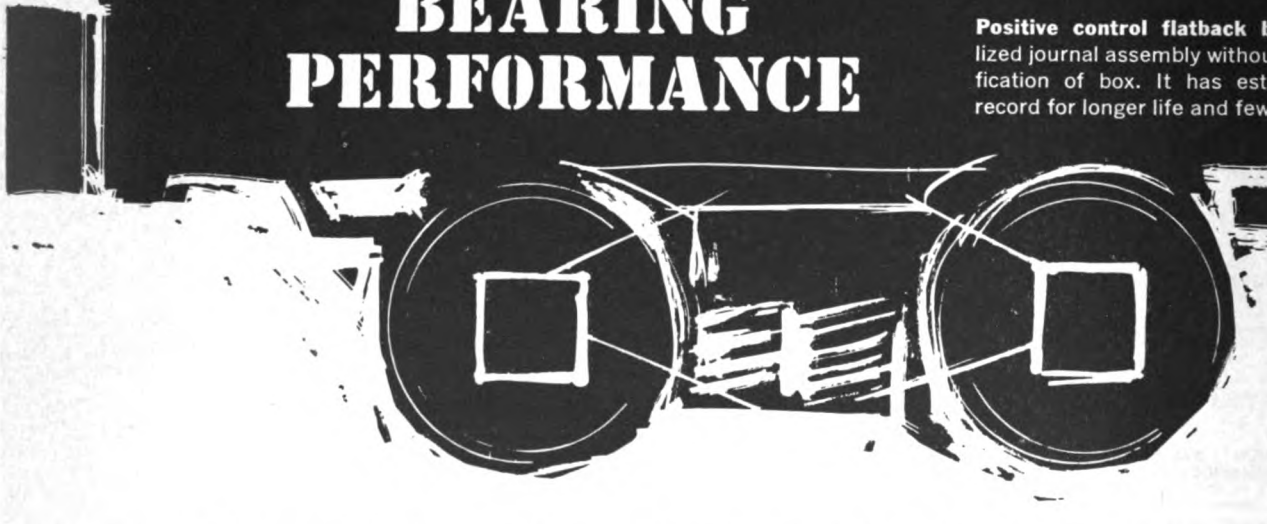
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POSITIVE CONTROL

KEY TO BETTER JOURNAL BEARING PERFORMANCE

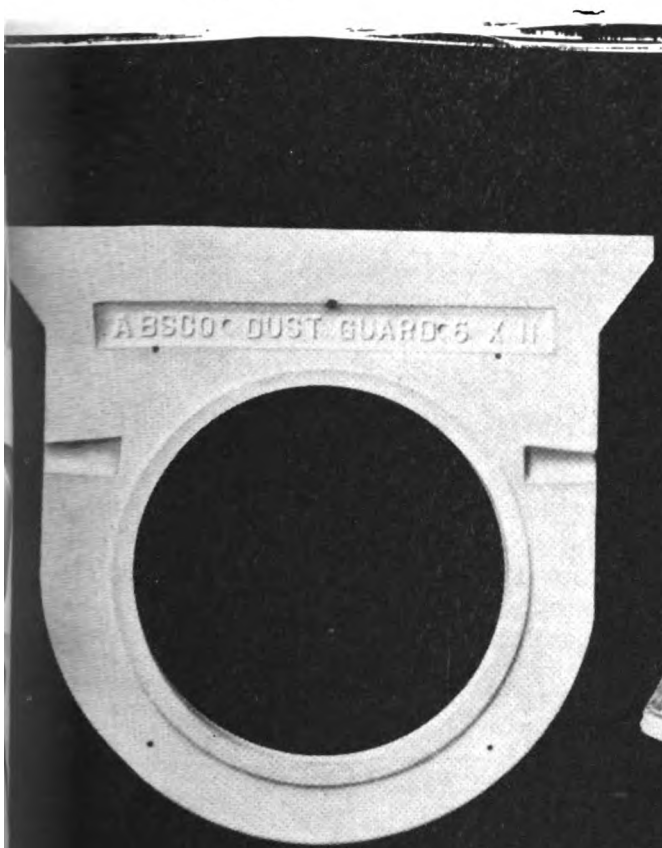


Positive control flatback bearing† achieves st
lized journal assembly without any alteration or m
fication of box. It has established an impress
record for longer life and fewer hot boxes.

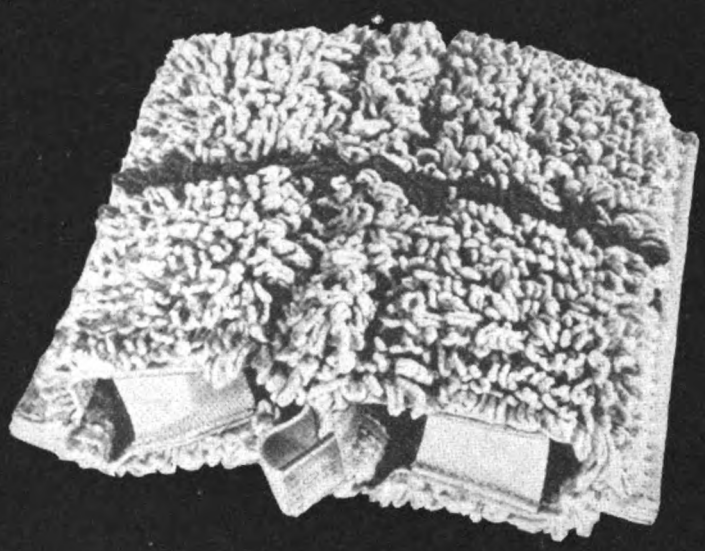


†AAR approved for lim
application for test in
interchange service.

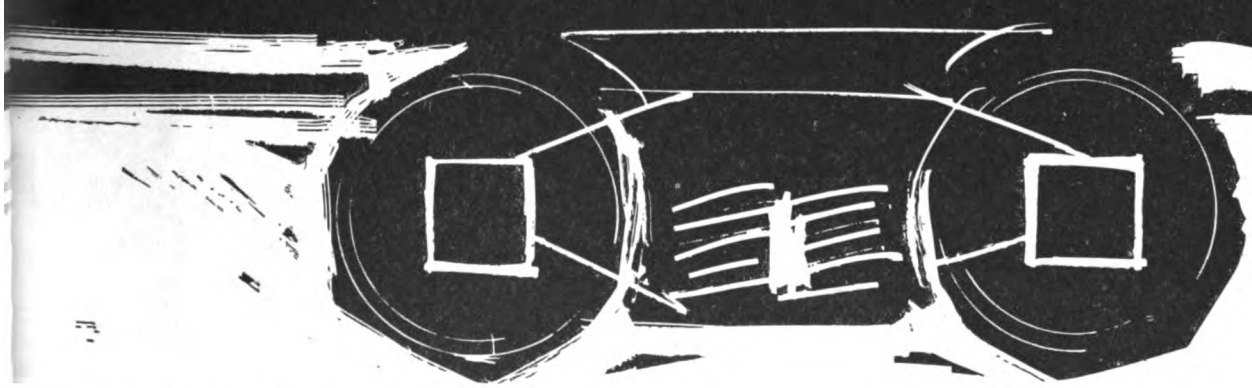
■ Dollar for dollar, this Absco positive control "package" appears to be the most efficient bearing assembly available. Applied to the average interchange car of today and tomorrow, it gives highest promise of upgrading bearing performance for the total fleet. ■ The key to this concept is positive control of journal and bearing motion, positive control of oil in the box, and positive control of oil flow to th journal. ■ To stabilize the axle, without the expense of jou nal stops and box modification, use Absco positive contr flatback bearings. To keep oil in the box and foreign mat rial out, install simple, inexpensive Absco dust guards. T feed sufficient quantities of oil to the journal, rely on Absc



Positive control of oil in box is an important advantage of the Absco dust guard. Simple, durable, economical, it effectively keeps oil in, keeps dirt and water out.



Positive control of oil flow is assured by the Absco lubricating pad*. It is simple to install, easy to renovate, and efficient under all conditions.



*AAR conditionally approved.

ıbricating pads. ■ Singly and in combination, these bearıg products are helping progressive railroads cut costs nd improve services. Your American Brake Shoe repreentative will be glad to give you full details. American Brake hoe Company, Railroad Products Division, 530 Fifth Aveue, New York 36, New York.

A-1896

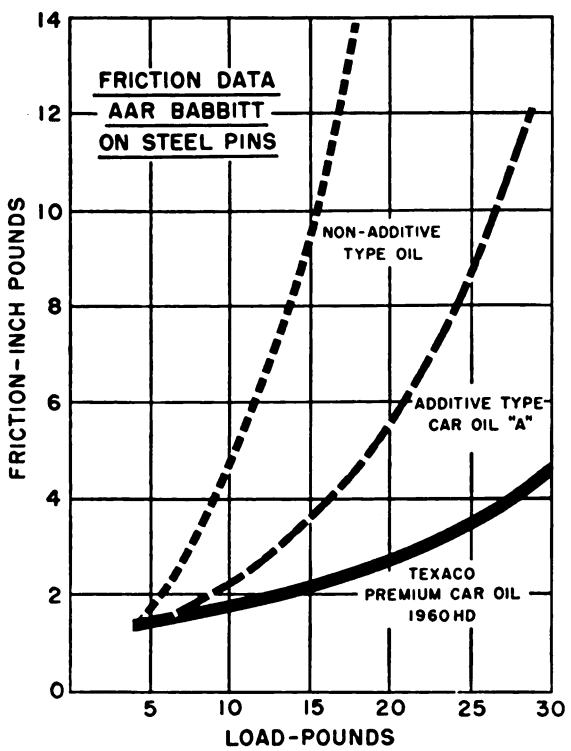
AMERICAN Brake Shoe COMPANY

Quality products cut your ton-mile costs.

Three reasons why new
can help reduce ho

60% less friction

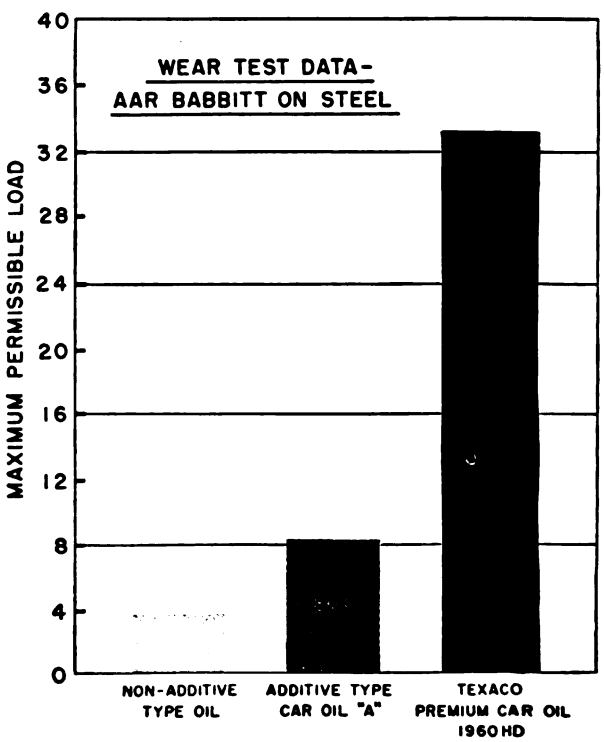
Less friction means lower operating temperatures . . . an important reason why Texaco Car Oil 1960 HD can help cut hot boxes as much as 40%. A special additive gives Car Oil 1960 HD a 60% lower friction coefficient under heavy load than most non-additive type oils.



Lower friction coefficient of Texaco Car Oil 1960 HD graphically illustrated. Car Oil 1960's ability to resist friction becomes even more pronounced as load-pounds are increased. The uniform quality of Texaco Car Oil 1960 HD assures consistently reliable performance.

8 times greater load-carrying capacity

Metal-to-metal contact between journal and bearing, the result of localized high bearing pressure, is a common beginning of hot boxes. Actual tests at Texaco's Research Center prove that Car Oil 1960 HD retains its protective oil film at a pressure *8 times greater* than the failure point of a non-additive type oil.



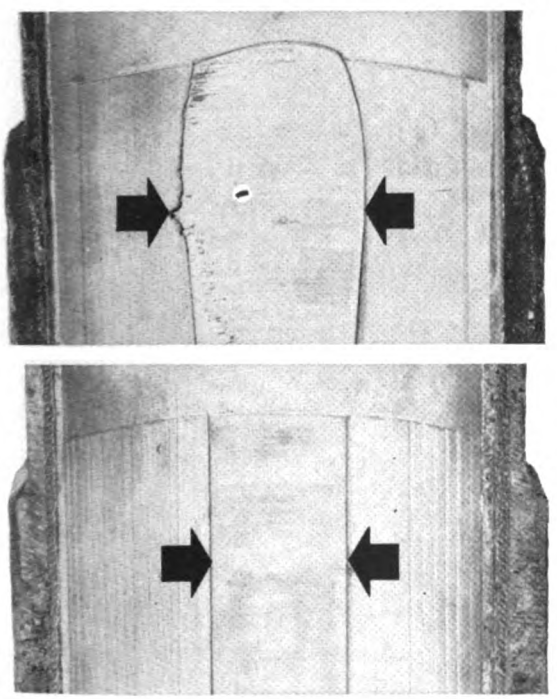
Greater load-carrying capacity of Texaco Car Oil 1960 HD graphically illustrated. Car Oil 1960 HD retains its protective oil film at a laboratory pressure much greater than would be encountered under average operating conditions.

Car Oil 1960 HD can actually prove more economical

Texaco Car Oil 1960 HD boxes as much as 40%

Minimum bearing metal displacement

Scored, worn, and misaligned bearings are also a common cause of hot boxes. Texaco Car Oil 1960 HD has a built-in characteristic that hinders gross bearing metal removal. Instead, Car Oil 1960 HD redistributes minute amounts of babbit... *actually assists in reseating the bearing.*



Smoother bearings with Texaco Car Oil 1960 HD. Contact areas of above journal bearings were reduced to 9 sq. inches and subjected to identical tests. Serrated edges (arrows) on top bearing, run on non-additive type oil, indicate considerable metal displacement. Straight edges (arrows) on lower bearing, run on Texaco Car Oil 1960 HD, indicate almost no metal displacement.

Savings can reduce car oil costs by 22¢ a gallon

Five major roads reported up to 40% decreases in hot boxes after switching to Texaco Car Oil 1960 HD. Savings because of reduced hot boxes can more than offset the slight additional cost of premium Texaco Car Oil 1960 HD.

For example: Suppose a road using 200,000 gallons of car oil yearly reduces hot boxes from 1,100 to 660 by switching to Car Oil 1960 HD in all journal boxes—using both summer and winter grades. A minimum saving of $100 on each eliminated hot box would net this road $44,000. This sum, if applied to the purchase price of the car oil, would reduce its cost by 22¢ a gallon. Therefore, in real terms, the per-gallon-price of Texaco Car Oil 1960 HD is actually about 16¢ less than the price previously paid for the non-additive type oil.

For full details on how Texaco Car Oil 1960 HD and unmatched service can mean fewer hot boxes for your road, call the nearest Texaco Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta. Or write:

Texaco Inc., *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.

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Report

(Continued from page 5)

Automated Trains Called Natural Progression

Progress in electronic circuitry, communcation media, and servomechanisms have produced the evolution from the continuous automatic train control system of the 1920's to today's fully automatic trains. L. R. Allison, section engineer of Union Switch & Signal, told last month's AIEE Automation Conference in Cleveland, Ohio, that this has been a "natural and logical progression."

Mr. Allison said the step-by-step evolution has been:

- Cab signaling with or without speed limiting;
- Elimination of wayside signals;
- Automatic control of speed;
- Automatic control of slowing or stopping;
- Elimination of the engine crew.

Mr. Allison discussed some of the current automation projects including portable and remote locomotive controllers, the "slave" or unmanned helper locomotive, the automated subway train of the New York Transit Authority, and the automation of long freight trains (RL&C, Nov. 1960, p 21).

Equity Could Trigger Technical Breakthrough

Railroads can achieve massive technical breakthroughs in the next decade "provided prompt action is taken to bring equity among all the nation's carriers," New York Central President A. E. Perlman told the National Press Club recently.

Carrying the industry's plea for equal treatment to an audience often considered to be the most influential in America, Mr. Perlman predicted that, by 1970, the railroads would be offering the following facilities if given the chance:

- New lightweight metal freight containers—interchangeable with every mode of transport—that would replace today's conventional freight cars.
- Completely automatic trains running under electronic controls. Express trains, said Mr. Pearlman, could deliver goods to major cities on one-day schedules, and coast-to-coast service would take as little as three days.
- Fast, streamline commuter trains, providing low-cost service to metropolitan stations where passengers would be fanned out by bus and subway.
- Integrated transportation so that a businessman could buy, from a railroad, freight service by rail, air, highway or water—or a combination of any of these four, depending on the speed and cost desired.

Orders and Inquiries for New Equipment

Placed Since the Closing of the June Issue

Diesel-Electric Locomotive Orders

NORFOLK & WESTERN. *Electro-Motive.* 24 GP-18, 1,800-hp all-purpose road switchers. *Alco.* 6 RS-11, 1,800-hp road switchers. Deliveries expected to be completed by August. Cost of 30 units, over $5,750,000.

READING. *Electro-Motive.* 10 900-hp switchers. Four to be equipped with multiple-unit controls. For July, August, and September delivery.

Freight-Car Orders

AMERICAN CAR & FOUNDRY. *Company shops.* 340 95-ton ore cars for a mining company in Northern Minnesota.

ERIE-LACKAWANNA. *General American.* 100 85-ft piggyback flat cars. Cost, approximately $1.5. Delivery scheduled for around September 1.

FRUIT GROWERS EXPRESS. *Company shops:* 90 50-ton, 40-ft bunkerless refrigerator cars; 120 70-ton, 50-ft bunkerless refrigerator cars. For delivery beginning in September.

GENERAL AMERICAN. *Company shops:* 29 30,300-gal tank cars—10 for Wanda Petroleum; 10 for Union Petroleum; 5 for Cities Service; 4 for Signal Oil.

GRAND TRUNK WESTERN. *American Car & Foundry:* 200 50½-ft double-door box cars. For September delivery.

KANSAS CITY SOUTHERN. *Pullman-Standard.* 150 all-steel, 50½-ft, 70-ton box cars, with 9-ft doors and roller bearings. 100 to have cushion-type underframes and 50 to have Evans DF loading devices). *American Car & Foundry.* 50 all-steel 50½-ft, 70-ton box cars with 9-ft doors, Evans DF loading devices, and roller bearings.

LOUISVILLE & NASHVILLE, *Pullman-Standard.* 550 70-ton hoppers: 40 90-ton aluminum-body covered hoppers. All cars to be roller-bearing equipped. For early delivery.

MAINE CENTRAL. *Thrall Car Manufacturing.* 50 50-ft, 50-ton pulpwood cars. For delivery at rate of 15 weekly beginning in mid summer. Estimated cost over $500,000.

NEW YORK CENTRAL. *Despatch shops.* 500 box cars (RL&C, June, p 6). Cost, $5,316,000. Delivery to begin this month.

NORFOLK & WESTERN. *Pullman-Standard.* 50 70-ton, 3,215-cu-ft-capacity covered hopper cars. Cost, over $500,000.

NORTH AMERICAN CAR. *Pullman-Standard.* 129 Lo-Dek flat cars equipped with tri-level Whitehead & Kales auto racks. For NITX car pool. 79 89-ft cars to be assigned to Milwaukee Road and 59 87-ft cars to the New York Central. June-July deliveries.

PHILLIPS PETROLEUM CO. *General American.* 50 30,300-gal tank cars. General American building additional cars for lease to other shippers.

SHPX 1, SHIPPERS CAR LINE SUBSIDIARY. *American Car & Foundry.* 80 100-ton aluminum Center Flow covered hoppers. To be leased to Kaiser Aluminum & Chemical Corp., with deliveries beginning in September. Order upgraded from original total of 60 (RL&C, June, p 32).

SANTA FE. *General American:* 100 85-ft roller bearing-equipped flat cars, 25 to be equipped with multi-level auto racks. For July-August delivery.

TRAILER TRAIN. *American Car & Foundry.* 1,000 flat cars. *Bethlehem Steel:* 75 flat cars. *Pullman-Standard:* 185 flat cars, including 115 of a special low-profile design to provide maximum clearance. All cars equipped with roller bearings and, according to Trailer Train, can be fitted with auto racks by individual roads. Deliveries completed in June. Additional 165 cars to be ordered in near future.

UNION PACIFIC. *Company shops.* 500 40-ft, 70-ton box cars with plug doors; 200 50-ft box cars with plug doors; 200 50-ft box cars with standard double doors; 200 50-ft, 70-ton insulated box cars equipped with self-contained load-security devices. Deliveries scheduled for remainder of this year and early 1962.

UNION TANK CAR. *Company shops:* 125 tank cars ranging from 10,000 to 30,000 gal capacity.

Passenger-Car Orders

NEW YORK CENTRAL. *Pullman-Standard.* 200 commuter cars. 26 to be purchased outright at a cost of $4,005,396. Port Authority of New York (under a commuter-aid plan that calls for further orders in the near future) will purchase remaining 27 cars at a cost of $4, 159,616, and will lease them to NYC for an initial period of 25 years.

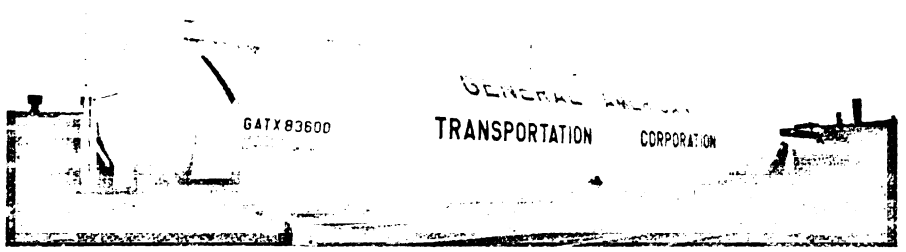
Notes and Inquiries

Metropolitan Transit Authority of Boston has requested bids for 92 high-speed rapid-transit cars to replace all 135 cars now in service on Cambridge-Dorchester line (RL&C, June, p 7). Deliveries, to begin in July 1962, to be completed by March 1963.

New York City Transit Authority inquiring for 200 new subway cars for IRT line. Reported bids will be sought on an additional 300 cars next fall.

Philadelphia Passenger Service Improvement Corp., who have been asked to bid on the supply of 26 commuter cars for PSIC (RL&C, June, p 6), requested to furnish costs for up to 30 more cars, provided additional funds are available in 1961-62. Specifications call for placing the new air-conditioned, stainless-steel cars in service within 15 months after award of contract. Cars to be purchased with public funds as part of city-sponsored rail modernization plan. City to lease equipment to the Pennsylvania and Reading.

Reading rebuilding six Alco locomotives in company shops. Work includes installation of new Alco engines.



In the construction of this 30,300-gal tank car, General American engineers have eliminated the conventional underframe, utilizing the tank as the longitudinal structural member which takes the stresses of buff and draft. The car is 66 ft long—19 ft shorter than other large-sized tank cars. Tank diameter increases from 99 in. at each end to 118 in. at the midriff. Because of the bulge in the tank, which prevents installation of brake rods from such a central point, each truck is equipped with a separate air-brake system. According to Spencer D. Moseley, General American's president, the capacity of tank cars built in the future can be varied by varying the length of center section. The car is the largest which can be built on four-wheel trucks; larger cars can be built with six-wheel trucks. The car has been leased to Phillips Petroleum Company which has ordered 50 for moving liquefied petroleum gas and anhydrous ammonia between manufacturing plants and its large storage points.

Personal Mention

Canadian National.—*Montreal:* N. A. KLOSNISKI appointed electrical and mechanical engineer. *Moncton, N.B.:* WILLIAM CAMERON appointed mechanical and electrical engineer, Atlantic Region.

Canadian Pacific.—*Winnipeg, Man.:* T. F. DONALD, superintendent of motive power and rolling stock, Prairie region, retired.

Florida East Coast.—*St. Augustine, Fla.:* H. P. HAHN, JR., appointed general car supervisor.

(Turn to page 54)



The built-in hypocycloid gear is the power secret! Free to follow the eccentric crankshaft, but not free to rotate itself, it produces a 6:1 reduction ratio.

nt Pending

NEW! Wine Power Geared* Discharge Gate

EVEN UNDER A 70-TON LOAD one man can open this new gate. Accurately machined mating surfaces provide bind-free operation and a tighter seal. No more sledging or car damage in attempts to open "frozen" hopper doors. Electric steel castings eliminate distortion.

PRECISION-MESHED GEARS without costly machining! Amazingly accurate shell molding process helps keep unit competitively priced despite *Power-Gear* feature. Rack-and-pinion principle assures parallel operation without side binding. All bearing surfaces are permanently lubricated.

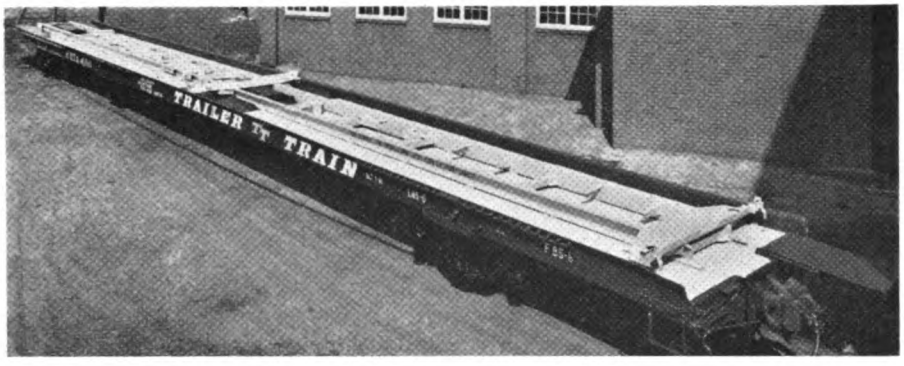
COMPLETELY PREASSEMBLED for easy installation, ready for welding. No further fitting, no extra parts required during assembly of car. 13x24″ opening fits most standard chutes. Interchangeable with most present gates; equipped with standard boot groove. Conforms to all recognized unloading devices. Now in service on six major railroads.

A TRIAL APPLICATION WILL CONVINCE YOU! Complete specifications and application data on request.

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Railway Appliances

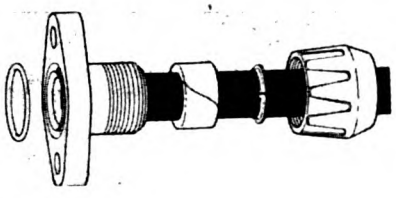
WINE Railway Appliances by UNITCAST CORPORATION • TOLEDO 9, OHIO

WHAT'S NEW IN EQUIPMENT



Container Cradles For Flat Cars

The Duo-Cradle, permanently fitted to the decks of 85-ft piggyback cars, makes them suitable for container service. The cradle frame carries removable cross-bolsters and consists of a pair of side channels spaced by cross-members. It is cushioned by a pair of deck-mounted shock absorbers. The channels straddle the trailer hitches on the cars and can, themselves, be straddled by the dual wheels of tractors and trailers after the cross-bolsters are removed from the frame. Clips attached to the car deck serve as guides and retainers for the cradles. When a container is carried, it rides on a pair of the removable cross-bolsters mounted on the frame. Separate cross-bolster positions permit handling containers of different lengths. For trailer service, the cross-bolsters are removed and stored lengthwise in racks carried by the frame between the channels so as not to interfere with the movement of trailers on the cars and to be instantly available for the hauling of containers. *Youngstown Steel Door Co., Dept. RLC, 590 The Arcade, Cleveland 14, Ohio.*

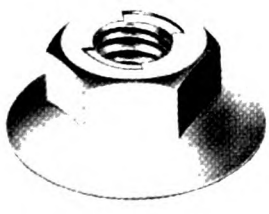


Pipe Fitting

A positive seal, regardless of temperature variations from —50 to 200 deg F, is said to be obtained from the Gripseal air brake pipe fittings. The compression ring which grips the pipe is of special hi-lo temperature rubber compound. Its Teflon coating eliminates twisting or galling of the compression ring when the nut is tightened and insures non-adherence of the ring to the inside surface of the nut when subjected to charring temperatures. A stainless-steel retaining ring prevents extrusion of the compression ring which can be renewed without dismantling the pipe. The land and groove design on the surface of the compression nut gives extra wrench clearance and permits use of open end or pipe wrench when servicing. Fittings are available in all standard sizes for freight and passenger cars and locomotives. *New York Air Brake Co., Dept. RLC, 230 Park ave., New York 17.*

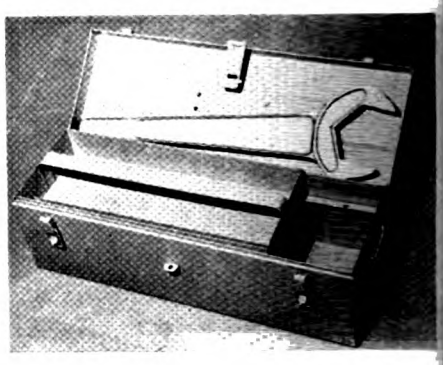
Magnetic Particle Testing

Concentrates forming a new group of materials for the wet method of visible and fluorescent magnetic particle testing are in powder form. Their mixing, handling, and storage features are said to be superior to those of previous Magnaflux and Magnaglo pastes. Fluorescent brilliance is increased from 70 to 600%; particle size range is closely controlled, and there is less foaming and more corrosion protection. Four materials are for the visible red or black Magnaflux method, and four for the fluorescent Magnaglo method. Certain concentrates are formulated specifically for oil suspensions; others, for water. The concentrates can be added directly to the oil after measuring the proper amount in a graduated cup, a uniform suspension being obtained almost immediately. *Magnaflux Corp., a subsidiary of General Mills, Dept. RLC, 7300 W. Lawrence ave., Chicago 31.*



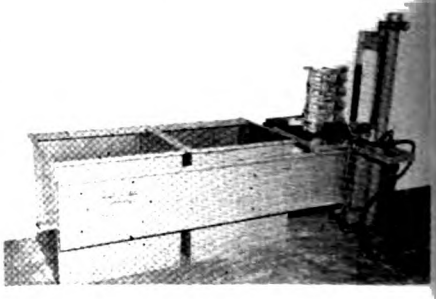
Flange Nut

The M-F flange nut combines both nut and washer in one cold-forged piece. The flanged face, it is said, eliminates the need for extra washers and can be used to gap oversize holes; to provide extra bearing surface; maintain pressure in vibration absorbers, etc. The Unit-Torque locking feature, in a wide range of sizes, can also be supplied with the nut. *MacLean-Fogg Lock Nut Co., Dept. RLC, 5535 N. Wolcott ave., Chicago.*



Portable Tool Box

A tool box, large enough to hold outsized 26-in. wrench, has a carrying handle on top, as well as chest handles at each end. The box is 26½ x 8¾ x 9 in. high and weighs 20½ lb. Tote tray, with socket compartment, also fits other chests in the MBC line. *Metal Box & Cabinet Corp., Dept. RLC, 4720 West Lake st., Chicago 44.*



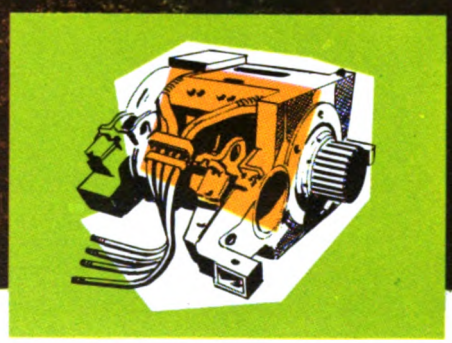
Cleaning Tank

The Porto Lif "tramway" for multi-tank cleaning is a 75-lb capacity, lever-controlled unit that provides 100 to 140 up-and-down motions per minute in cleaning solution. Work is loaded on the platform of the tank at floor level. It is then pneumatically raised and manually rolled on track into position over the first tank. A flick of a lever lowers the platform into the cleaning solution and automatically starts the agitation. At end of cleaning period, the platform is raised and the unit rolled into position over the next tank for an agitated rinse. The unit can be adopted for pre-wash, wash, rinse, anti-rust, or dry operations. It is also available for mounting on 30- and 55-gal drums. *Equipment Div., Magnus Chemical Co., Dept. M-124-3, Garwood, N.J.*

(Turn to page 57)

N. Y. CENTRAL'S "SUPER-VANS" KEEP PRECISE SCHEDULES WITH AN ASSIST FROM NATIONAL BRUSHES

TRADE-MARK



Because of fast freights or "Super-Vans" as they are known on the New York Central, today's major tonnage is returning to the progressive railroads of the nation.

To maintain precise schedules, every component in the consist—no matter how large or small—must offer exacting performance and rugged reliability.

"National" traction-motor brushes—wherever they are used—provide dependable life and commutation and thereby contribute to added miles with a reduction in commutator maintenance costs.

To National Carbon Company, improved railroading means a positive program to help the roads solve problems imposed by constantly changing and more difficult electrical conditions. To realize this assistance, just call your "National" Brush Man or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.



Contact your "National" Brush Man

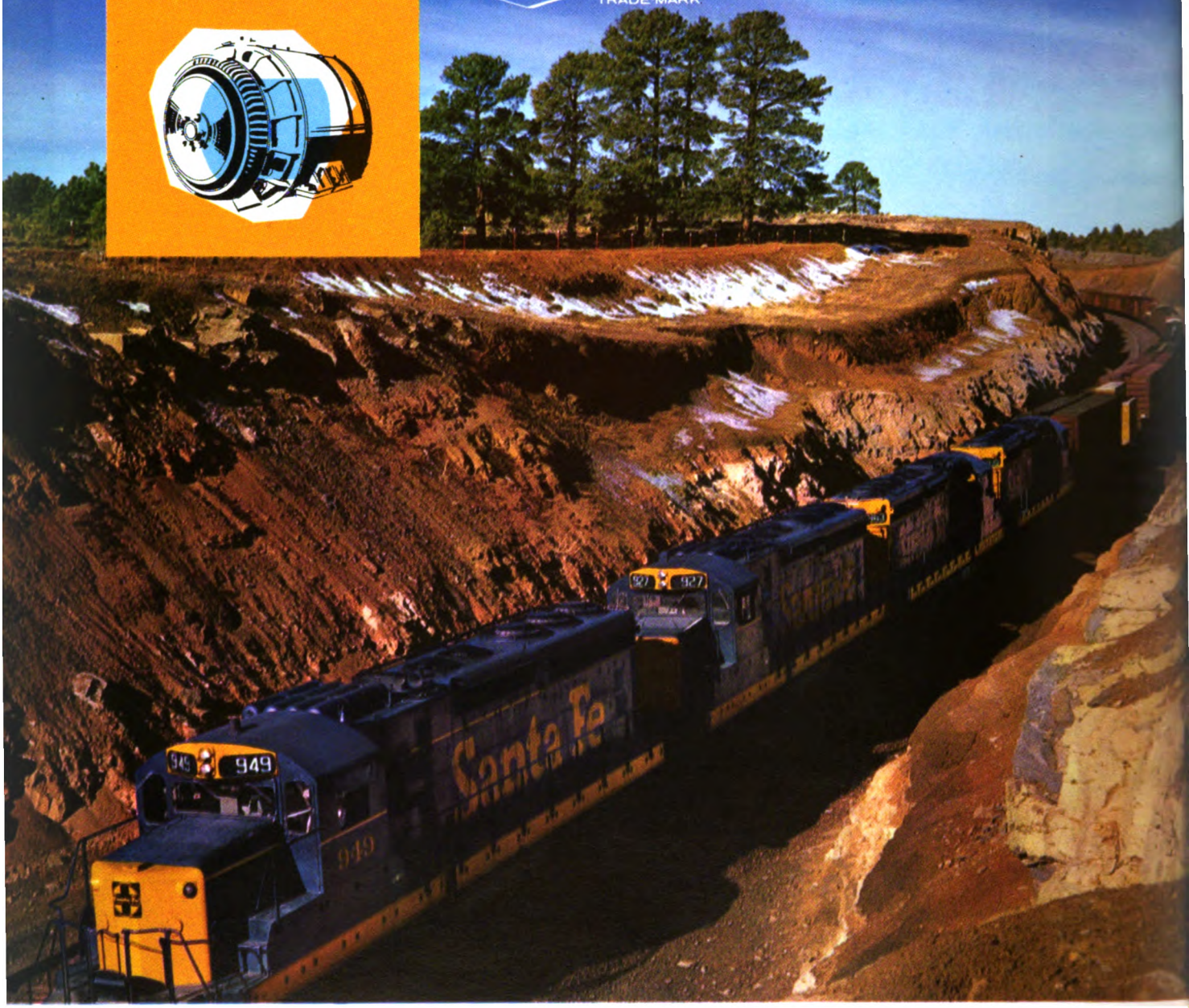
UNION CARBIDE

"National" and "Union Carbide" are registered trade-marks for products of

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THE SANTA FE'S FAST FREIGHTS KEEP EXACTING SCHEDULES WITH AN ASSIST FROM NATIONAL BRUSHES

TRADE-MARK



Progressive railroads like the Santa Fe are using fast freights for improved, accelerated service for their customers. This modern service requires trouble-free motive power with minimum lost-time for maintenance.

Every component in the complex locomotive—no matter how small or large—must perform dependably under conditions of heavy loading and high speed to meet the exacting requirements of the Santa Fe.

"National" generator brushes—small but vital components—offer proved commutation and life qualities and operate with the reliability so necessary for today's progressive railroad service.

One of our contributions to improved railroading is a positive service program on carbon brushes. Just call your "National" Brush Man or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. In Canada: Union Carbide Canada Limited, Toronto.



Contact your "National" Brush Man

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NATIONAL CARBON COMPANY

EDITORIALS

Why the Difference?

The AAR directive to "curtail meetings" unless there is a good reason for doing otherwise has been interpreted differently by different divisions of that organization.

The Mechanical Division held a "limited annual business session" on June 28 and 29. It did so as its interpretation of the AAR directive to economize. The session was closed; only the General Committee, chief mechanical officers or their personal representatives, and committee chairmen, were invited. As a result not more than 50 men attended the meeting.

In the latest issue of the "AREA News" the Engineering Division discusses future meeting plans. In alternate years it will hold 1½- and 2½-day meetings. The 1962 meeting will be a 1½-day meeting, a meeting that can be compared with the Mechanical Division's meeting this year. However, the AREA indicates that it will invite officers and all committee members, a total of 250 men, and will welcome everyone that wishes to attend, railroad and railway supply men alike. In other words, this division will hold an open meeting.

Why are there two different interpretations of the same directive? We do not know the answer, but we believe the AREA's interpretation more logical. The work of the AAR divisions is too important to everyone in the industry to be exclusive.

Now Is the Time

Plans to attend and participate in the September meetings at Chicago of the Coordinated Associations and see the exhibits of the Allied Railway Supply Association should be made now.

Excellent and worthwhile programs, as reported in our June issue, have been set up by the Air Brake, Car Department Officers, Locomotive Maintenance Officers, and Railway Fuel and Operating Officers Associations. Meetings of these four associations will start Monday, September 13. No meetings will be held Tuesday afternoon to give all an opportunity to inspect the exhibits.

As this issue goes to press, the Allied Railway Supply Association reports that all the upper floor exhibit space at the Hotel Sherman has been sold and the only remaining available space is in the lower exhibit hall. About 4,500 ft of the 6,500-ft track space at the Illinois Central's 31st Street Yard has been sold to date, already three times the track exhibit space of the 1959 meetings when only 1,500 ft of track was used to display cars and locomotives and their components.

Both the programs and the exhibits point to a September show at which all railroads should be represented. The meetings of the associations will give all mechanical department men the opportunity to find out how savings in maintenance can be achieved. The exhibits will present the latest developments in equipment, tools, and products that produce savings and improve service.

We urge all railroads to take advantage of these meetings and exhibits because the September conventions have earned an enviable reputation of being outstanding in their value to the industry. Those in September, 1961 promise to be among the best; they merit and deserve fine attendance. If plans have not already been made, now is the time for each chief mechanical officer to make sure that his department has adequate representation.

Better Run Scared

Railroad automation was the subject of a two-day session of the Land Transportation Committee of the American Institute of Electrical Engineers held in Cleveland, Ohio, June 6 and 7, 1961. Papers presented dealt with automated trains, computers, mail handling, unmanned locomotives, and train dispatching. Mechanization has for years been taking over in railroad service, and now it is apparent that some mechanical functions will be completely automated.

A recent example of particular interest is an installation on the Quebec, North Shore & Labrador Railway. Raw gravel is dug from a bank by a shovel and loaded into cars. The operation which follows is controlled by one man and consists of spotting the cars for the shovel, delivering the gravel, a mile away, through crushers and screens as high-quality railway ballast to outgoing cars. The gravel is moved in cars hauled by a remotely controlled diesel locomotive. The plant produces 225,000 cu yd of ballast during a 165-day working season. Extension of the operation, including a seven-mile haul, is planned.

Most forms of mechanization are welcomed by those who are affected by them. It makes the job easier; it permits doing more work, and at least sustains the ability of an employer to continue employment. The character of the work may make changes which necessitate new training and new skills. This can cause awkward displacements, but it has been shown many times that new methods and processes, with more mechanization, makes more work rather than less.

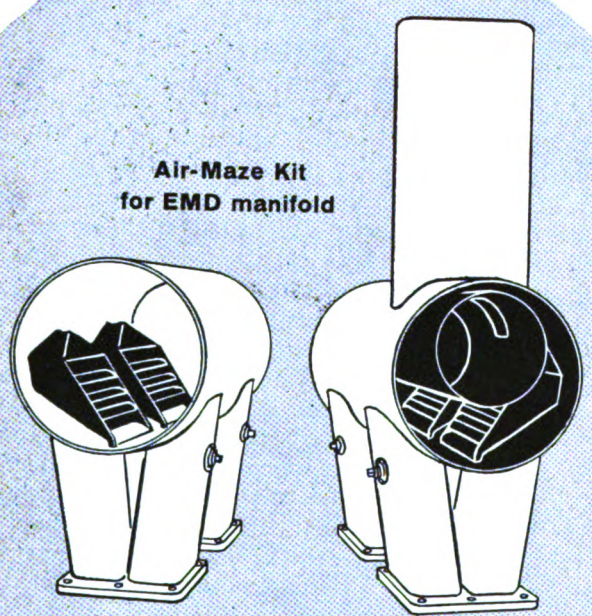
Now the system which has raised American living standards so high is in jeopardy. Foreign competitors also have good mechanization and, among workers whose wage scale is half of ours, there is practically no unemployment. New forms of automation and mechanization must be developed constantly if current or better standards of living and railroading are to be maintained or developed. No one knows enough about our international situation to say just when or how much new competition we can expect, but there is enough in evidence to indicate that it is an excellent idea to run scared.

EASIER INSTALLATION... LESS DOWNTIME!

AIR-MAZE spark arrester conversion kits!

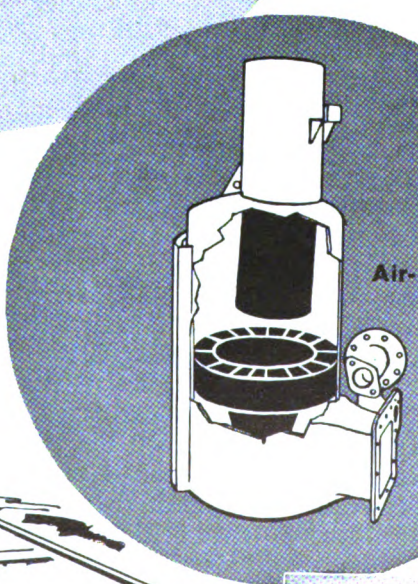
FOR DIESEL LOCOMOTIVES

Air-Maze Kit for EMD manifold

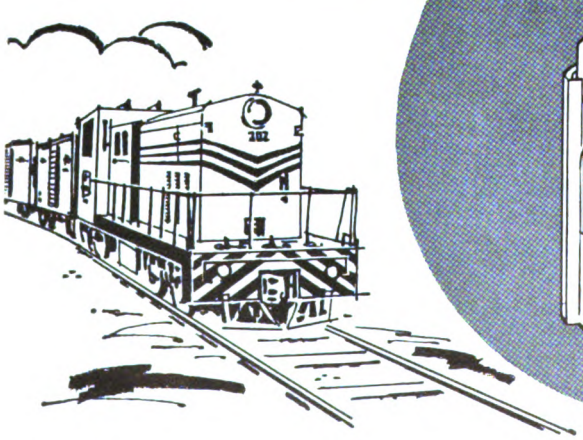


Air-Maze Spark Arrester Kits eliminate the need for obtaining a new manifold to get effective spark control. Deflecting vanes can be simply installed in original manifold during routine engine shopping. Simplified design minimizes number of man hours required for conversion . . . alignment problems sometimes encountered with fitting and welding are minimized.

The Air-Maze Spark Arrester is designed for use with the exhaust manifolds of both EMD and FM switcher and road units. It operates on the principle of centrifuging incandescent particles to reduce their size and temperature before they are exhausted. The addition of the Air-Maze Spark Arrester Kit does not affect engine performance.



Air-Maze Kit for FM manifold



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P R I MEMBER

AIR-MAZE DIVISION
CLEVELAND 28, OHIO

ROCKWELL-STANDARD CORPORATION

ROCKWELL R STANDARD

Engine Air Filters • Car Body Filters
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The uniform, dense macro-structure of Edgewater wheels is shown in this unretouched photograph—one-half size.

you can see the uniform quality of Edgewater rolled-steel wheels

Cut a random section from any Edgewater Rolled Steel Wheel and you'll find grain structure that is dense and homogeneous.

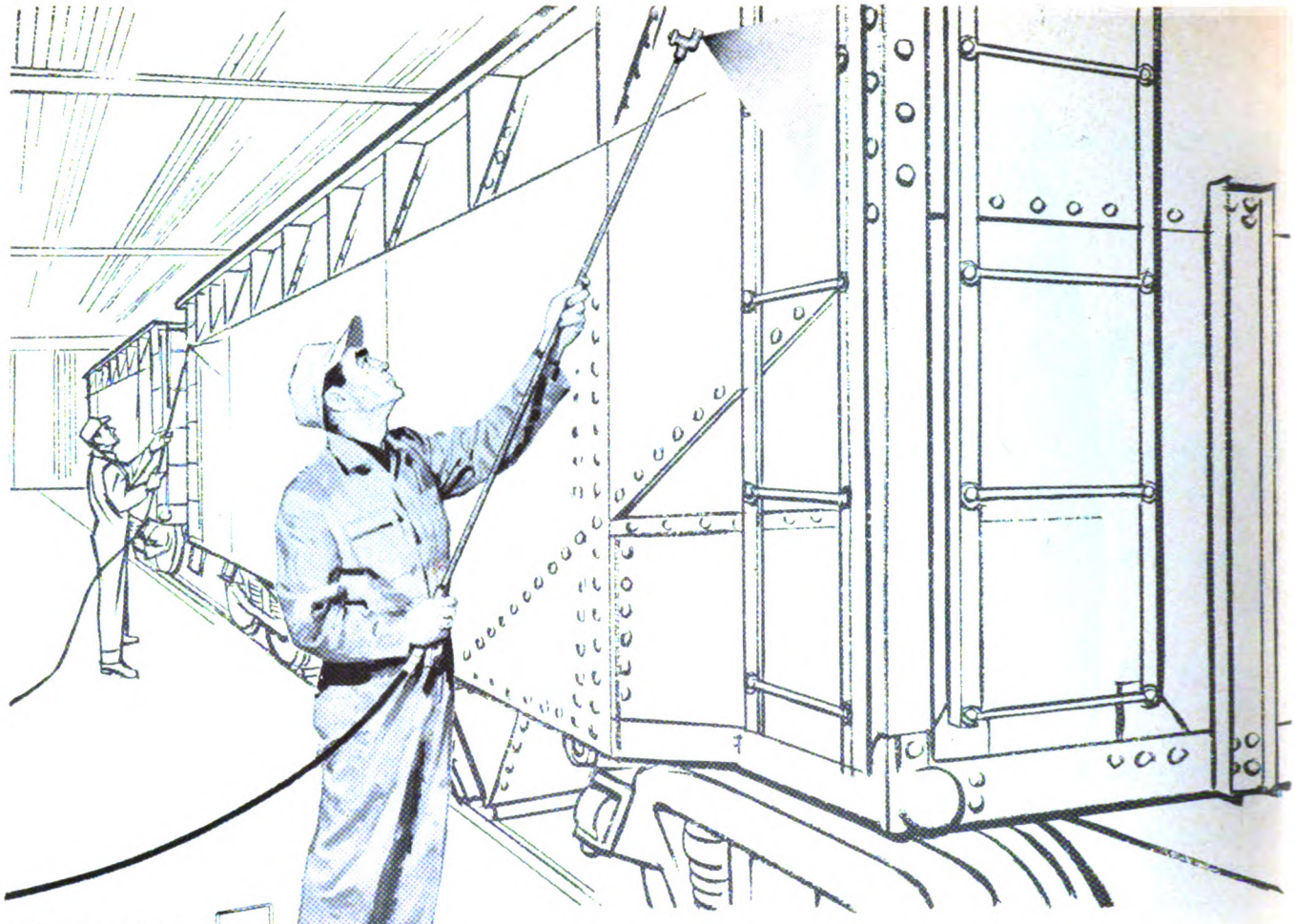
Sound, uniform, forged and rolled steel gives Edgewater Wheels the high strength and toughness needed to resist rail joint impact and the stresses imposed by high speeds, heavy loads and severe braking.

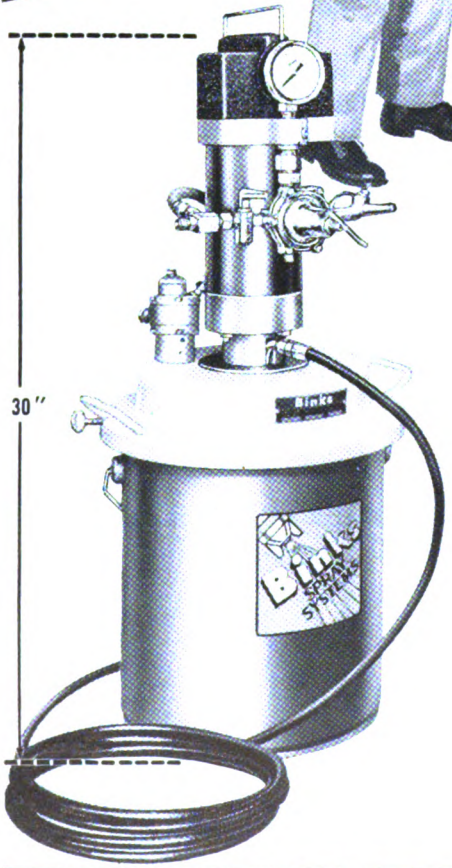
Specify Edgewater Rolled Steel Wheels.

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RPI MEMBER

EDGEWATER STEEL COMPANY

P. O. Box 478 • Pittsburgh 30, Pa.





New COMPACT airless spraying outfit

...faster RR car "face lifting"—with less paint!

The new Binks compact airless spraying outfit puts paint on the surface of the railway cars . . . not into the air.

Indoors or outdoors the new airless lets you take advantage of high production spray equipment in places and applications where material is usually brushed on.

Only 30 inches high, the new Binks compact airless outfit is light enough to carry around (only 35 lbs.) for a variety of maintenance jobs. All metal surfaces, exposed to spraying materials, are made of tough, non-corrosive stainless steel.

For all the facts, write or call today. Ask for Bulletin A98-11.

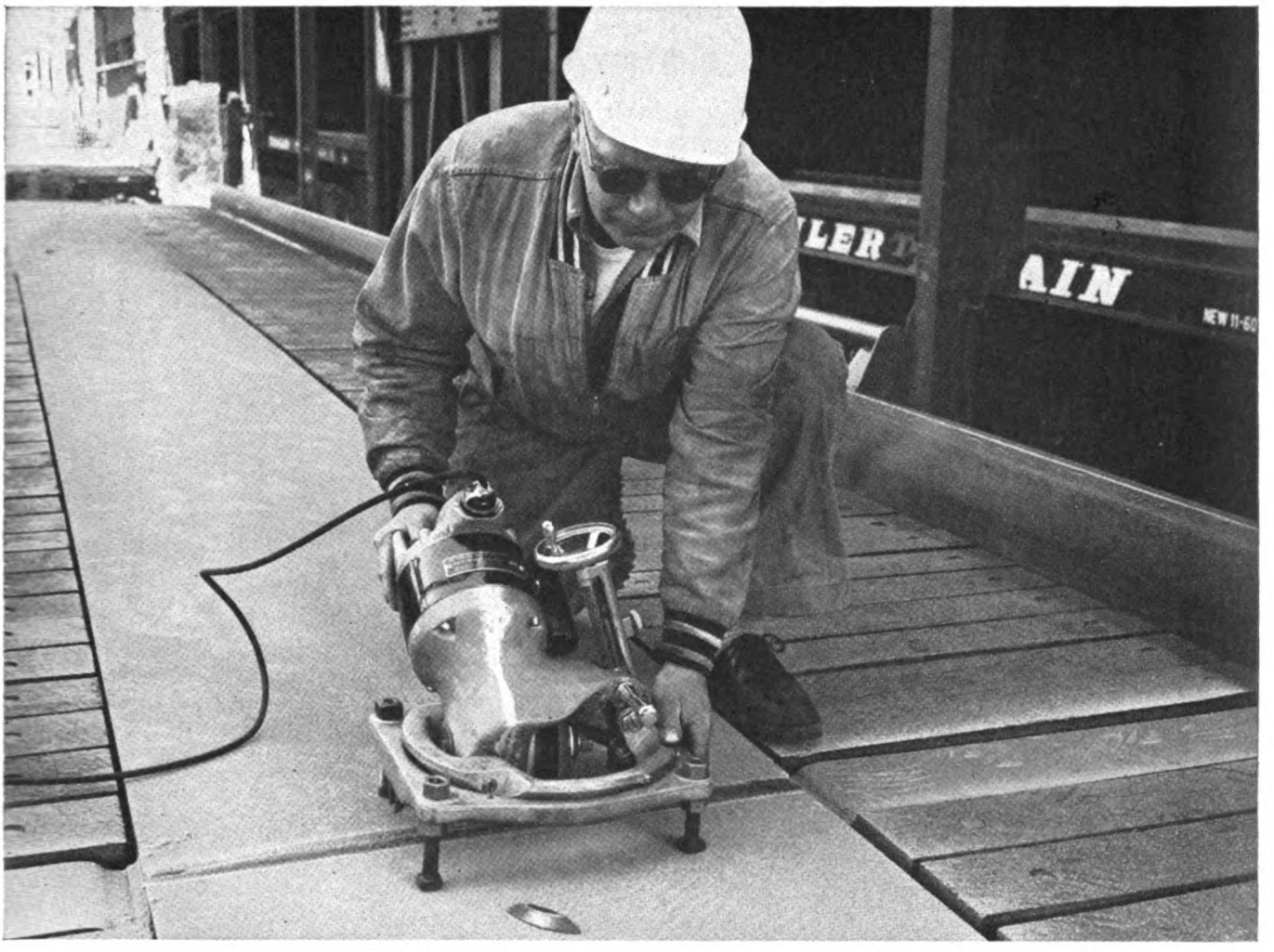
Ask about our spray painting school. Open to all . . . NO TUITION . . . covers all phases.

Binks Manufacturing Company 3140-B Carroll Avenue, Chicago 12, Ill.

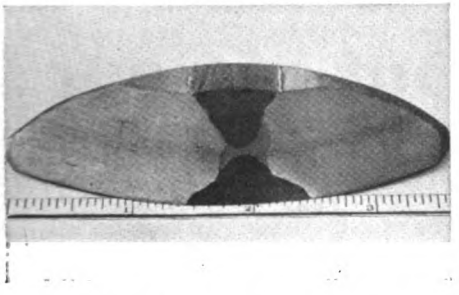
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1229

Binks | Everything for spray painting



Quality control at work on a Bethlehem 85-ft flat car



This 4-inch weld specimen gives inspector good look at weld quality. If it shows detects, a new weld is carefully supervised, and immediate steps are taken to correct the problem at the source. This is but one way in which Bethlehem upholds high level of quality on all freight cars.

What's this? Deliberately cutting up the center-sill cover-plate on a brand new piggyback flat car?

That's exactly what he's up to. He's holding a weld-prober, which cut the little boat-shaped specimen from the buttwelded joint in foreground. The specimen gives this quality control engineer a good look at the workmanship in the weld. If he spots any defects, such as slag inclusions, cracks, porosity, lack of fusion or penetration, he'll know what to do about them—*and he'll do it.*

The soundness of every weld and the quality of each part are essential to the service life of a whole freight car. That's why Bethlehem's quality control engineers are in the shops at all times, checking on every detail of construction, helping to overcome difficulties, often suggesting improvements.

It's paying off, too. We're developing such a high standard of excellence in car construction that one of these days we believe you will find it unnecessary to inspect our product. You will pocket the savings. We'd like to demonstrate our ideas of quality on your next order.

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
Export Sales: Bethlehem Steel Export Corporation

Steel *for Strength . . . Economy . . . Versatility*

BETHLEHEM STEEL

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CREATIVE RESEARCH • QUALITY PRODUCTS • PROFESSIONAL SERVICE



Squeeze the last drop out of your cleaning dollars with NUVAT

NUVAT, Wyandotte's heavy-duty vat cleaner, cuts your cleaning costs three ways. It rapidly removes soils other vat cleaners won't touch—there are no do-overs, no hand cleaning on benches. You spend less time rinsing because NUVAT solutions don't deposit scum on parts or tanks. And NUVAT lasts longer in your tank—cutting dumping downtime and the need for frequent material additions. Prove NUVAT for yourself. Call in your Wyandotte railroad-cleaning specialist.

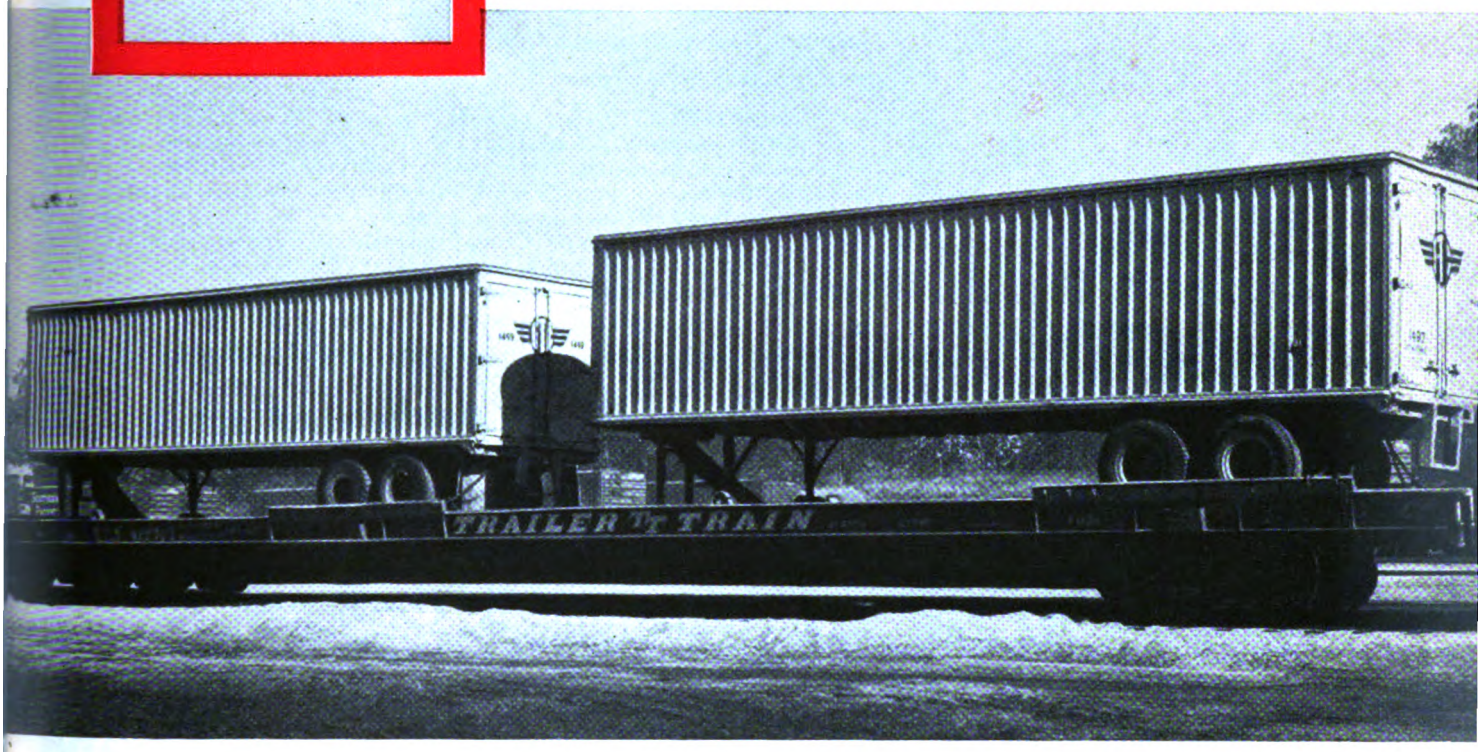
Wyandotte Chemicals

J. B. FORD DIVISION

WYANDOTTE, MICHIGAN • LOS NIETOS, CALIFORNIA • ATLANTA, GEORGIA



PAYLOAD: Piggyback Pays Of with Dependable Equipment



Less than 5 years ago the Trailer Train piggyback system of freight transportation began . . . with only two members. Today it covers 75% of the Nation's Class 1 railroad mileage.

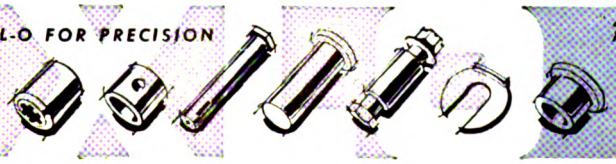
Piggyback is still growing. And its fast, rugged cross-country service is making greater demands on railroad cars and their parts.

That's why Ex-Cell-O "Diamond Hard" pins are specified for all new cars added to the Trailer Train fleet. Hardened and ground Ex-Cell-O pins with their super-fine finish, deep steel case and ductile core provide greater resistance to wear, abrasion and shock . . . Ex-Cell-O qualities that mean maximum, trouble-free service.

Proven performance in both pins and bushings, plus Ex-Cell-O standardization, variety of sizes, immediate delivery and service mean lower operating cost. For the full story on how Ex-Cell-O can help your maintenance operation, contact your local Representative or write Ex-Cell-O direct.

61-8RR

EX-CELL-O FOR PRECISION



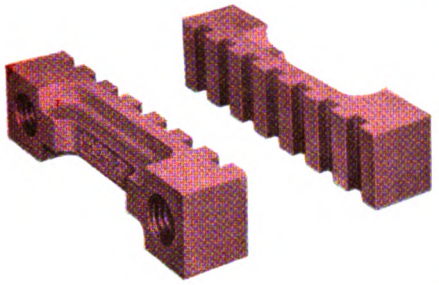
Railroad Division

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

STABILIZED JOURNALS—

Now MAGNUS offers you three low-cost ways to get

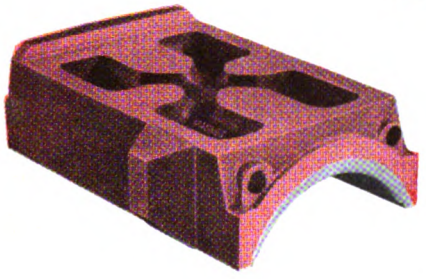
BETTER BEARING PERFORMANCE



1. MAGNUS R-S JOURNAL STOPS

Provide maximum stabilization of entire journal box assembly—increases miles per hot box ten times

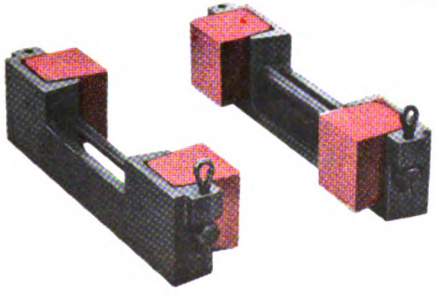
Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures—increase miles per hot box *ten times;* miles per cut journal, *fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.



2. MAGNUS FLAT-BACK SOLID BEARINGS

Wider, non-tilting design limits bearing displacement—provides effective stabilization at lower cost

The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust-guard, reduces loss of oil through enlarged dust-guard openings and tends to prevent spread linings in the bearing.



3. MAGSTOPS

Offer the inherent advantages of R-S Journal Stops in a low-cost, rugged, fabricated design

Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The next big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

MAGNUS METAL CORPORATION

Subsidiary of

NATIONAL LEAD COMPANY



Mechanical Division officers at head table at opening of the "limited business meeting" on Wednesday, June 28. Left to right: F. H. Stremmel, secretary; C. B. Rogers, assistant to secretary; Fred Peronto, executive vice-chairman; J. W. Hawthorne (chief mechanical officer, ACL), chairman, and J. A. Welsch (general superintendent motive power, IC), vice-chairman.



Two-day 1961 session, held at Chicago's Hotel Sherman, was attended by General Committee, technical committee chairmen, and chief mechanical officers of roads not represented on General Committee.

Mechanical Division Cutting RR Costs

Group stresses standardization and simplification in equipment design, maintenance, and accounting

Increased freight car load limits, gradual elimination of all cast-iron wheels on interchange freight cars, and simplification of interline car repair billing are being submitted to letter ballot by the AAR Mechanical Division. At last month's "limited annual business session," the General Committee acted to recommend these items for vote, and took other actions expected to aid the hard-pressed industry in controlling costs and improving the quality and reliability of its service.

Higher freight car payloads have been under study by the Mechanical and Operating - Transportation Divisions for some time. After considering the ability of car structures, trucks, and axles to operate satisfactorily under heavier loads, the Mechanical Division has proposed an increase of 5 percent in the stencilled load limits of all freight cars.

AAR Research reported that the higher loads could be carried safely by present axles. The 5 percent increase, if approved, will be effective on January 1, 1962.

Another proposed action will ban cast iron wheels on all interchange cars after 1967. Its investigations have assured the General Committee that there is sufficient steel-wheel production capacity in the U.S. and Canada so no shortage could develop during this changeover.

While reporting progress on the elimination of waste packing and in reducing hot boxes, the Committee warned that some car owners have been slow in applying lubricators. These devices are required on all cars after January 1, 1962.

Numerous changes are proposed for the recording and billing of repairs to interchange freight and passenger cars. These will make it possible for railroads to use machine billing for interline settlements.

The letter ballot will contain a proposal to standardize many of the body components of 40- and 50-ft box cars. Adoption of AAR standards can reduce the costs of many parts now tailored to the specifications of individual railroads.

A thorough analysis of draft gear performance is being made by the Research Center and the Committee on Couplers and Draft Gears.

Next year's meeting, to coincide with sessions of the Purchases and

Division Chairman Says . . .

Standardization Offers New Economies

Today, the mechanical officer faces problems far more complex and difficult than those faced by his predecessors. Lower traffic levels have reduced funds available for maintenance. Simultaneously, the mechanical officer must cope with more stringent government regulation and with labor organizations which have obtained fringe benefits that now make up a large portion of his labor costs.

The railroad industry is engaged in a fight for its very existence, striving to survive as a group of privately owned common carriers. The present wave of mergers is evidence of the efforts being made to reduce the costs of operating our railroad plant.

Mechanical officers must do their part in reducing costs. In the past, the diesel locomotive made possible economies in maintenance and servicing; mechanical departments have been able to consolidate many shops and enginehouses. Such actions did reduce railroad operating costs. However, those economies have already been absorbed by higher material costs, higher wage rates, and increasingly expensive fringe benefits. Mechanical Departments are engaged in a grotesque game of tag, attempting to institute labor and material savings at a faster rate than these costs increase.

There are still many avenues for economy open to alert mechanical officers. Not the least of these is standardization of freight-car parts which can reduce material inventories and, by making possible faster repairs, permit a smaller number of cars to handle any given traffic volume. No railroad, regardless of its size, can accomplish any degree of standardization by itself. The very nature of the operation of the American car fleet means that only combined action by all railroads can make possible standardized repairs with standardized parts.

To permit cars to be freely interchanged and to establish uniform maintenance standards, the railroads many years ago formed a trade association which has become today's Mechanical Division of the Association of American Railroads. Only through this agency can railroads achieve the standardization necessary to enable them to handle their freight traffic with the fewest possible units of equipment.

The Mechanical Division's committees assigned to establish standards for rolling stock and motive power are composed of technical men employed by member lines. Committee members are not paid by the AAR for their activities; all expenses involved in their AAR work are borne by their own railroads. In addition to their meetings twice yearly, many items are handled by correspondence. Although the members contribute much of their personal time to this AAR work, their roads necessarily lose many hours of their service.

If all railroad managements fully appreciated the importance of the Mechanical Division and its potential for economies, there is no doubt that many more mechanical department representatives would attend annual meetings and that more railroads would be represented on technical committees. Despite a rather general lack of understanding of its work, the fact remains that the standards established by the Mechanical Division do benefit the entire industry. Unless all participate in its activities, it will not be possible to take full advantage of the economies available through standardization, simultaneously providing more reliable, lower cost transportation.

—J. W. Hawthorne
Chairman

Stores Division, is scheduled for Chicago on June 12, 13 and 14, 1962. Final decision depends on economic conditions prevailing at that time.

Committee chairmen and vice-chairmen are to serve 3-yr terms under the Division's Articles of Organization adopted last year. It is expected that several new committee heads will be named shortly. Division Chairman J. W. Hawthorne and Vice-Chairman J. A. Welsch have served the first year of their 2-yr terms.

Summaries of committee actions appear on the following pages.





General Committee has two new members, again bringing its membership to 15. W. D. Dickie, (left), chief of motive power and rolling stock of the Canadian Pacific, and E. F. Tuck (right), chief mechanical officer of the Frisco, were elected to fill vacancies produced by retirement of L. R. Christy of the Missouri Pacific and promotion of E. Wynne of the Canadian National.

Roller Bearing Installations Are Increasing

Freight cars with roller bearings totalled 98,593 as of March 31, 1961, an increase of 16,178 cars — 19.7% — over a year ago. These figures were compiled by the Committee on Journal Roller Bearings which makes an annual survey of roller-bearing installations.

Design changes of the junction of the outer pedestal leg and top of AAR alternate-standard pedestal-type freight-car-truck side frames are intended to prevent the structural failures which have occurred at this point. A stronger pedestal key, to be submitted to letter ballot, has been designed by the Roller Bearing Manufacturers Engineering Committee. Its strength is expected to prevent roller-bearing wheel and axle assemblies from coming out of trucks during derailments.

Conditional certificate of approval has been issued to SKF covering a design change in the SKF Expediter general-purpose roller-bearing cage. SKF has also received conditional approval for its Piggybacker Class E special purpose spherical journal roller bearing.

The committee also reported that the certificate of approval covering Hyatt Hy-Roll Taper journal bearing covers Classes D, E, and F, not C, D, and E previously reported.

Because of satisfactory performance of Brenco roller bearings, Brenco has been authorized to increase its applications from 100 to 500 car sets.

A track arrangement for storing roller-bearing wheel and axle assemblies and a rack arrangement for wheel cars have been completed by the Committee. Both are designed to prevent damage to bearings in storage and transit. On standard "gauntlet" type wheel storage tracks the rails should be 3¾ in. apart. On wheel cars the axle-center distance is 23 in. for 33-in. wheels. Both prevent flanges from contacting the exteriors of bearings.

Freight Cars Equipped with Roller Bearings

March 31, 1961

	Hopper	Box	Gondola	Flat	Other	Total
Railroads	26,670	25,946	4,697	6,824	9,479	73,616
Private Car Owners	499	850	——	7,678	7,969	16,996
Non-interchange cars	65	48	3,160	343	4,365	7,981
Totals	27,234	26,844	7,857	14,845	21,813	98,593

Diesel Hydraulics Have Higher Ratings

Increasing interest in high-horsepower hydraulic transmission for diesel locomotives has been reported by the Committee on Locomotives and Locomotive Fuels and Lubricants. In addition to the six 4,000-hp C-C type A units nearing completion at the Krauss Maffei plant in Germany for the Denver & Rio Grande Western and the Southern Pacific, the Committee has studied the high-power units of European railroads. For high-power foreign diesels, hydraulic transmissions are usually either the Mekhydro or Voith type, both of which are claimed to have an overall transmission efficiency of 80 per cent.

This efficiency is achieved despite the narrow speed ranges in which torque converters give satisfactory performance. The Mekhydro transmission utilizes a gear train which functions to maintain the speed of the torque converter in an efficient range as locomotive speed varies. The Voith transmission has a series of torque converters which are individually effective in different speed ranges (RL&C, Feb. 1961, p 21).

Electro-Motive will do nothing further with the free-piston engine on locomotives. Road testing of the 2,000-hp experimental free-piston gasifier and turbine-electric locomotive, originally scheduled during 1959, has been indefinitely postponed.

Gas Turbines

The experimental 4,500-hp coal-fired GTE locomotive being built by the Union Pacific to evaluate components developed by the Locomotive Development Committee (RL&C, Sept. 1957, p 37) is approximately half completed. Initial stationary testing is expected to begin late in 1961, followed by road testing at Cheyenne, Wyo.

The UP expects to receive the last of 30 8,500-hp oil-fired gas-turbine electrics this month, bringing its total ownership to 55. The 25 4,500-hp locomotives continue in service between Council Bluffs, Iowa, and Ogden, Utah. They have generally been operated in multiple with one or more trailing diesel units. In 1960, the locomotives produced 10.3% of the freight gross ton-miles on the UP, averaging 6,552 miles per month.

The 4,870-hp gas turbines in the above locomotives have accumulated 758,633 fired hours to December 31, 1960. Since 1952, one of these turbines has 35,047 fired hours.

During 1960, 12 additional 8,500-hp gas turbines were put in service, increasing UP ownership from 11 to 23 units. Operating over the same territory as the 4,500-hp locomotives, the 8,500-hp units averaged 10,477 miles per month in 1960 and produced 10.9% of the freight gross ton-miles (RL&C, April 1961, p 24).

Fuel Oil Filters

The Committee has prepared a specification for letter ballot action on throw-away type fuel-oil filter elements used on the discharge side of the locomotive fuel transfer pumps. The specification does not cover suction or discharge filters of the cleanable type. It does not cover the filter element housing.

The specification is expected to accomplish the following objectives:

- Provide a sound basis on which the railroad industry can establish purchase specifications.
- Require filter manufacturers to furnish sufficient information on their filter elements to essentially eliminate performance or acceptance tests by any railroad.
- Place the responsibility for checking accuracy of the informtaion in the filter manufacturer's catalog with the AAR Research Department.

The specification establishes three classes of filter elements to cover the filtration requirements of the various grades of fuel being used. It places no requirement on filter element life. It does recommend that flow velocity through the filter element not exceed specific values, depending on the class of filter and the viscosity of the fuel. It also recommends that Class I elements not be used with heavy fuels or Class II elements with extra-heavy, economy fuels.

Results of a questionnaire to 28 member roads for the number and location of cracks in diesel locomotive axles over a one-year period show 49.5% reported were between the wheel and gear seats. Successful use of stress relief grooves is reported by one major road where it is now a standard practice for new axles. The section modulus of the stress relief groove is 85% that of the wheel seat.

The Committee reports that Vapor Phase equipment in locomotive diesel engines has proved uneconomical and impractical (RL&C, Jan. 1959, p 32). This pressurized cooling system seemed successful, because it did improve combustion and reduce wear rates when heavy fuel was used. The complicated equipment caused operating difficulties and required special servicing and fueling facilities.

The newly organized Committee on Electrical Equipment — Rolling Stock, which has taken on the functions of the former AAR Electrical Section, has completed a specification for shipment of batteries.

Improved Brake Lubricants Are Available

An air-brake lubricant superior to present standard triple valve oil is available. Following its tests, the Committee on Brakes and Brake Equipment recommended for letter ballot that Specification M-912 be revised to permit the use of this oil which has greater life and better low-temperature performance. The lubricant has a viscosity index of 140 and a pour point of minus 50 deg F. Several railroads have arranged to test AB valve performance over an extended period using this improved lubricant, also using another, known as Silicone SF-81, which is now under study.

Tests of brake-cylinder greases are also being made to find a longer lasting, all-weather lubricant. Road service tests are now under way to select the best and most economical lubricant. The AAR Research Center, National Research Council of Canada, and brake manufacturers are all engaged in this work.

Much brake-pipe and cylinder leakage is due to breaking of pipes at threaded sections. Because the threadless type fittings virtually eliminate this, the Committee recommended that Interchange Rule 3 require flanged-type, threadless air-brake fittings be used on all cars built new, rebuilt, or receiving heavy repairs after January 1, 1962, for all pipe sizes 1 in. and smaller. Conditional approval has also been given to a modification of the compression-type, flanged union fitting which has been introduced by the air-brake manufacturers. This fitting has improved sealing characteristics, simplified seal renewal, and is interchangeable with present standard fitting.

Service performance of AC-1-B brake equipment applied to passenger cars has been generally satisfactory. Changes in the rubber diaphragm material have corrected difficulties encountered with these portions. AC brakes applied to GN ore cars have more than four years' service, and a summary report of an inspection made May 23, 1961, is being prepared.

Locations of angle cocks on cars having sliding center sills, long travel, and long overhang from truck to end sill have proved to be a complex problem. The Committee recommends that angle cocks be located under the coupler shank as is done on lightweight passenger cars. This arrangement would eliminate the right angle elbows and long flexible hoses introduced by car builders.

Two types of on-tread composition brake shoes, approved for application to 1,100 interchange cars, have not yet seen sufficient service to evaluate performance of these shoes.

Three types of off-tread brakes each have approval for application to 250 cars. Frequent inspections have indicated satisfactory performance, and these inspections will continue.

Box-Car Components To Be Standard

Standardization of side doors, sides, ends, and roofs of conventional 50-ton general-purpose box cars has been proposed by the Committee on Freight and Passenger Car Construction. Cooperating with the Purchases and Stores Division, which reported that railroads are paying extra costs because of their failure to standardize these components, the Committee has prepared specifications and drawings which will be submitted for letter ballot.

Components are for both 40-ft and 50-ft cars having single-sliding, plug-type, double-sliding, or combination sliding-and-plug-type side doors. Inside car lengths will be 40 ft 6 in. and 50 ft 6 in., respectively. Inside widths will be 9 ft 4 in. standard, and 9 ft 2 in. and 9 ft 6 in. as alternate standards. All single-door openings will be 6, 8, 9, or 10 ft in width. Dou-

ble door openings will be 12, 14, 15 and 16 ft, with 40-ft cars having a maximum permissible door opening of 14 ft. Sheet thicknesses and sizes of rolled and fabricated sections for sides, roofs, and ends have been fixed. Further refinement and standardization of other car parts is under study.

Shipper groups have been seeking to have box cars marked to indicate the size of the door opening. A standard arrangement has been proposed for stencilling the outside of the car door about 4 ft 4 in. above the car floor with this information: *OPENING W O-O H O-O.* Another proposal to indicate the type of lading device on the side of each box or refrigerator car with an AAR rather than a manufacturer's designation was investigated. It was decided that no action would be taken.

Limiting cross-sectional dimensions of freight cars have been under study by the Committee for several years. The limits are given in Manual Plate B, "Equipment Diagram — Unrestricted for Interchange Service." Increasing length of freight cars led to a proposal at the 1959 meeting that each car with truck centers greater than 41 ft 3 in. have its width reduced to compensate for the increased overhang of its center and ends on curves. This was not adopted but referred back to the Committee for more study.

Recent eliminations of many railroad clearance restrictions have resulted in a new survey to determine if Plate B could be changed. Instead, the Committee has recommended, for letter ballot, that an additional drawing — "Maximum Width of Cars with Various Truck Centers"—to be designated Plate B-1, be included. It relates maximum car width to truck center distance for all truck centers from 39 to 75 ft, but leaves the cross-section limits of the basic car, Plate B, unchanged.

Safety Appliances

Failures of brake steps of hopper cars on which, apparently, car shakers have been used are being investigated by the Committee. Because brake steps of various types and with different supports have been involved, a member road conducted tests of different designs to determine the type best able to resist shaker action. This resulted in a proposal to the Arbitration Committee that all brake steps applied to new and rebuilt cars on which shakers are used for unloading be of an approved perforated type, because this type performed better than the grating type.

Gaps of 1 in. will be allowed between the sections of metal running boards on all cars if a recommendation of the Safety Appliances Committee is approved. The action followed the suggestion of a member road which reported that the presently required ⅜ in. between sections is not practicable for the removable roof sections of covered gondolas.

Working with the Committee on Safety Appliances, the Car Construction Committee has approved a circular dome platform for tank cars of General American Transportation Corp. and has added the Apex Type S running board to its approved list.

The Safety Appliances group also reported that it is studying the lowering of the hand brake and retainer valve on high-side and house-type cars and is even considering elimination of the retainer.

A proposal to eliminate running boards and their latitudinal extensions on box and house-type cars is being followed. Commenting on this, the Safety Appliances Committee reported: "The elimination of unnecessary appliances which will provide economies in the construction and operation of freight cars without affecting the safety of operation is currently an important railroad industry requirement."

A specification for two-piece rivets applied by hydraulic, pneumatic, or hand-operated tools to take the place of bolts or conventional rivets in the application of safety appliances has been completed. Two-piece rivets of the following manufacturers comply: Townsend Co., Cherry Division of Townsend Co., Standard Pressed Steel Co., Huck Manufacturing Co., and Vaishan Manufacturing Co.

Welding Repairs

Damage to roller bearings on cars and locomotives resulting from improper location of the welding grounds has been of concern to the Car Construction Committee since 1953; the Electrical Section Manual prohibits grounding on the rail or wheel. Current flow through solid bearings can cause similar damage. It has been recommended for letter ballot that the Manual and Interchange Rules 22 and 23 be altered to prohibit location of a ground connection which could produce current flow through any type of journal bearing when welding is in progress on cars.

Welding of high-tensile (Grade C) alloy cast-steel truck side frames has been a subject of discussion for two years. Differing interpretations of Interchange Rule 23 have been resolved with proposed letter ballot action covering these side frame repairs.

To guard against crack formation, truck side frames of Grade C steel must be preheated before any welding is done. After welding in the shaded areas shown in Fig. 14, the weld must be stress relieved by local heating. After the welding of pedestal liners, these liner welds cannot be stress relieved without destroying the hardened condition of the liners. Normalizing of side frames is not necessary after any welding is done in the shaded areas, but should be mandatory following all welding outside the shaded areas.

A study of bolster and side frame failures made in 1959 led the Car Construction Committee to recommend earlier this year that Interchange Rule 3 be altered to prohibit in interchange after Jan. 1, 1962 those cars having side frames cast prior to 1920, and also to prohibit the use of side frames cast before 1926 on new and rebuilt cars. The Arbitration Committee has since referred this back for further investigation.

Standardization of side frames and bolsters has been jointly investigated with the Purchases and Stores Division and the Truck Manufacturers Engineering Committee. Result is a new AAR Code for Designating Design Features for Side Frames and Bolsters Having Built-In Snubbing Devices and Single-Shoe Brakes. It will give ready identification to interchangeable components and will establish code numbers useful in stocking and purchasing. Revised test procedures for new side frames and bolsters will also be submitted for letter ballot.

New Gage Detects Unserviceable Pads

A new standard gage for checking the resiliency of "pillow-type" lubricator pads will be submitted for letter ballot by the Committee on Lubrication of Cars and Locomotives. Instead of making a simple height check as is done with the present gage, the new device has a foot-operated pedal which compresses the pad during inspection. This will make it possible to determine if pads have, during renovation, lost their resiliency so that there may not be sufficient contact with the journal.

The new device, developed by one of the commercial renovators, has the following advantages according to the Committee:

- Detects excess moisture in core and cover which can then be corrected by a longer renovation period.
- Detects deteriorated core material.
- Results not affected by unusual fluffiness produced during cleaning.

Tests of the new device have shown results which convince the Committee that it will prevent the return of unsatisfactory pads to service.

During the past year the following lubricators have been granted the "Approved for Test" status: Accurate, Almco, Atlas, Crown, Economy, Kar-pak, Landreth-Pak, Royal, and Truk-pak. The following have been advanced to "Conditional Approval" from the "Approved for Test" status: Absco, Easy-Flo, Premier, Southland, Utility, and Wikit.

Working with the Committee on Freight and Passenger Car Construction, a study has been completed on non-standard journal boxes which might complicate the application of standard lubricating devices.

Boxes having transverse ribs in the interior should have these ribs cut out to assure that the lubricator will function properly, the committee reported. It is proposed to alter Paragraphs 6 and 7 of Rule 66 to permit the use of pad type lubricators which do not extend laterally beyond the journal limits in non-standard journal boxes.

Instructions for the free oiling of journal boxes, Section k of the Lubrication Manual, will be modified if a proposed revision wins letter ballot approval. It will call for placing some oil on top of lubricator pad in extremely cold weather during the course of bringing the free oil level to the present standard ½-in. depth.

Following difficulty experienced with the H-type solid journal bearing which resulted in its redesign and designation as the I type (RL&C, April 1961, p 45), an investigation of wedges was undertaken. Wedges were credited with causing much of the trouble experienced with the H bearing. Cooperating with the Car Construction Committee.

several conditions are being studied: stricter requirements for manufacture and reclamation of wedges; more rigid standards for continuing wedges in service; and new credits to be allowed for them in interline billing.

The Committee on Lubrication reported that road tests of the 170-deg flat-back bearing show it is controlling journal movement. The bearing was subjected to impact tests at the AAR Research Center which reported "somewhat improved stability under impact conditions up to about 8 mph when compared with the present standard journal bearing without journal stops."

The journal stop also continues to show "remarkable results" in prolonging the service obtained from bearings, dust guards, rear seals and lubricators, and also in preventing displacement of the lubricator. The following stops have been granted approval for test during the past year: Magnus, Zytel 2-M Nylon, and Zytel 424 Nylon types. An additional rear box seal, the Hennessey AR-12, has also been granted test approval.

Extension of relubrication periods for both roller bearings and cartridge type solid bearings continues under investigation. Referring to the sleeve, or cartridge type, the committee reported that "with proper modification" of the bearing, its lubrication probably can be extended from the present 90-day interval to "beyond six months." Already 6-month relubrication is under test.

Relubrication of all types of rotating-end-cap roller bearings at 36-month intervals and during wheel changes is under study. Such periods are already allowed for Timken bearings, and tests now in progress will decide if it can be extended to others.

No Cast-Iron Wheels After 1967

More stringent condemning limits imposed in the past two years have not proved effective in reducing cast-iron wheel failures. The Committee on Wheels and Axles recommended, in effect, that no cast wheels be manufactured after 1963. The General Committee has since expanded this by proposing, for letter ballot, that all chilled-iron

Preview of 1962 Interchange Rules

Numerous changes have been recommended for the present interchange Rules by the Arbitration Committee. Many will be submitted to letter ballot. It is probable that the next revision will incorporate most of the changes. Rule number, section and paragraph follow in that order, unless otherwise indicated.

Rule 3-a-4.—Modification will indicate that extra heavy fittings are to be used with the extra heavy pipe required for air-brake piping on new and repaired cars. Rule 17 will be modified accordingly.

Rule 3-a-7. — Modification will fix the location of angle cocks on cars having Type F interlocking couplers, requiring compliance with Page E-28A of the Manual.

Rule 3-b-5.—Elimination of Note 1 pertaining to bottom rod guard safety supports will remove conflict with Rules 3-b-5 and Rule 17-m.

Rule 3-s-10.—Addition of new paragraph will emphasize mandatory nature of standard air-brake stenciling required on all cars by Rule 60.

Rule 3-w-5, 6, and 7.—Modification of Paragraph 5 will ban cast-iron wheels on all cars in interchange after January 1, 1968; addition of new Paragraph 6 will prohibit use of cast-iron wheels manufactured after January 1, 1964; present Paragraph 6 will be renumbered 7. This proposal, to be a letter ballot item, is called "an orderly plan to eliminate cast-iron wheels without needless loss of serviceable material. . . ."

Rule 4-f-3.—Modification will indicate that any hole larger than 6 in. in any dimension in the side or end of an open-top car is a defect.

Rule 7.—Modification, a letter ballot item, will allow use of billing repair forms and procedures which are arranged for machine accounting of interline billing. Similar changes in Rules 8, 93, and 96.

Rule 10-f-8.—Addition of new paragraph will provide for use of Experimental Type A, 28-in. diameter, one-wear, cast-steel wheels as recommended by Committee on Wheels and Axles.

Rule 16-4.—Modification of paragraph with a tabular specification of free heights and condemning spring loads for freight-car springs so second-hand springs having lost half of reserve travel at maximum working load will not be installed in cars.

Rule 17—n, o and v. — Modifications will eliminate references to charges and credits no longer proper because net applied prices have been adopted for truck bolsters, side frames, and running boards.

Rule 17—f, n, o, r, and u.—Modification and addition of paragraphs will make Rule 17 consistent with Rule 101 in which net applied charges are now established for bolsters, side frames, running boards, steps, retaining valves, hand brakes, and bottom rod safety supports.

Rule 17-t.—Modification will establish conditions for renewing journal lubricators removed when changing wheel sets. Similar change will be made in Rule 65. Interpretation m-10 modification will add ice temperature control devices, the diesel-powered air-circulating system recently introduced for bunker refrigerator cars.

Rule 18-f.—Modification will require removal of worn draft keys when there is $^{5}/_{16}$ in. wear at any point.

Rule 30—b.—Modification will add covered hoppers to list of cars (2) which are to be light-weighted only by owner, or owner's agent, and will eliminate them from 30-month reweighing.

Rule 32-10-k. — Modification of Note 2 will add "other heating device" and specify that handling line is responsible for damage to rubber draft gears, automatic slack adjusters, wheels and axles, and other parts rendered inoperative, as well as to center sills and air brakes.

Rule 32-11.—Modification will add "handling-line damage to container" so that responsibility for containers, removable roofs, and covers will be established in cases where there is no damage to the car.

Rule 60.—Modification and rearrangement of Rule 60 in its entirety will cover periodic attention to air-brake equipment and results from deletion of certain air-brake information from Rule 101 and elimination of Rule 111.

Rule 61-d.—Eliminated because this portion pertaining to in-date testing has been incorporated in Rule 60 with other air-brake details.

Rule 66-g.—Modification will indicate that only new lubricators are to be used when waste is being replaced.

Rule 66-h-2.—Modification will indicate that stenciling indicating non-standard repack periods is to be eliminated and the cars stenciled to indicate standard repack intervals.

Rule 66-h-4.—New Item 8 will be added indicating "Removed account change of wheels and axles (two lubricating devices for one pair of wheels in a separable box truck and four devices in an integral box truck)."

Rule 85.—Modification of third paragraph will indicate that a failure of cartridge type journal bearings will not be allowed if the car is more than 30 days overdue for periodic lubrication, or if the date cannot be read on the car.

Rule 93.—Complete revision, a letter ballot item, will permit machine accounting for interline billing.

Rule 96.—Modification, a letter ballot item, will allow group billing and remove restrictions on "adding machine tape only."

Rule 101. — Regular modification will include new material and labor prices and changes in lists of approved brake-beam supports, journal lubricating devices, metal running boards.

Rule 104.—Rule will be completely eliminated because data is covered in Rules 101 and 105.

wheels be banned from interchange equipment on January 1, 1968.

Service failures of Class C [high carbon] wrought-steel wheels under cars operating in passenger service have resulted in a recommendation that these wheels be prohibited under passenger cars equipped with tread brakes. This type of wheel was designed to be used with disc brakes.

The 33-in., two-wear, wrought-steel wheel, presently designated as AAR X-6, would be restored as a standard AAR design if the committee's letter ballot recommendation wins approval. This wheel, with 2-in. rim thickness, is needed today for applications on roller-bearing cars in order that wheel life will "more nearly approximate bearing life," the committee reported. In addition, a 33-in., two-wear, Class B cast-steel wheel has been authorized for test under 2,000 interchange freight cars and has been designated AAR X-9.

Wheel requirements for high-capacity cars and for low-deck cars are being developed by means of interchange-service tests on other cast-steel wheels. Cars in excess of 70-ton nominal capacity must now have 36-in. wheels, and the committee authorized the manufacture of 7,000 car sets of Class A and Class B cast-steel wheels in this size to be designated as follows: AAR X11—one wear; AAR X12—two wear, and AAR X13—Multiple wear.

To make possible lower decks on piggyback cars, the 28-in. wheel has been introduced. Authorized have been 1,000 car sets of 28-in. Type A cast-steel wheels, and 1,000 car sets of 28-in. Type B cast-steel wheels designated AAR X-8 and AAR X-10, respectively.

Increased fatigue strength for freight-car and locomotive axles has been a major concern of the Committee and the AAR's Chicago Research Center for some years. A test program involving conventional locomotive axles made of AAR Specification M-126 Grade H steel has been completed, and a second program comparing Grade H axles with Grade F axles is now in progress. Commenting on the completed test, the committee reported "good correlation with the results of the fatigue test data from investigations made during the development of the raised-wheel-seat passenger-car axles." Fatigue failures induced under very high loads resulted in fractures in the wheel seat next to the gear seat about 2 in. into the wheel bore from the inner hub.

Investigations of the alternate standard "as forged" body, raised-wheel-seat, freight-car axle adopted in 1955 have shown that this axle may not have the life of the standard passenger-car axle after which it was patterned. Present-day operation of freight cars at full capacity and high speeds may result in the need for a freight-car axle with endurance limits comparable to the present design passenger-car axle. Testing indicates lack of uniformity in the fatigue endurance limit of the "as forged," non-heat-treated and unmachined axle body. Endurance limits 4,000 psi below that usually found for car-axle bodies have been observed. Internal residual stresses in the forged surface are also indicated.

Although heat treatment was found to be of benefit in improving the fatigue life of the unmachined body, additional cost would likely cancel the price advantage of this axle. It is questionable that forging can produce a smooth surface axle body to close tolerances without a considerable increase in cost. The committee concludes that it may be more economical to forge axle to coarser tolerances and rough machine the body to the dimensions of the passenger-car axle. This change would permit this freight-car axle to be manufactured in the same way as plain-bearing passenger-car axles, except for the smooth machining required for the coach axles. Additional data on the residual stresses in the press fit of the wheel on the wheel seat may make it necessary to increase the wheel-seat diameter.

AAR MECHANICAL DIVISION
COMMITTEE CHAIRMEN

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N. A. Passur


T. H. Bickerstaff


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H. L. Hewing


F. H. Einwaechter


C. E. Pond


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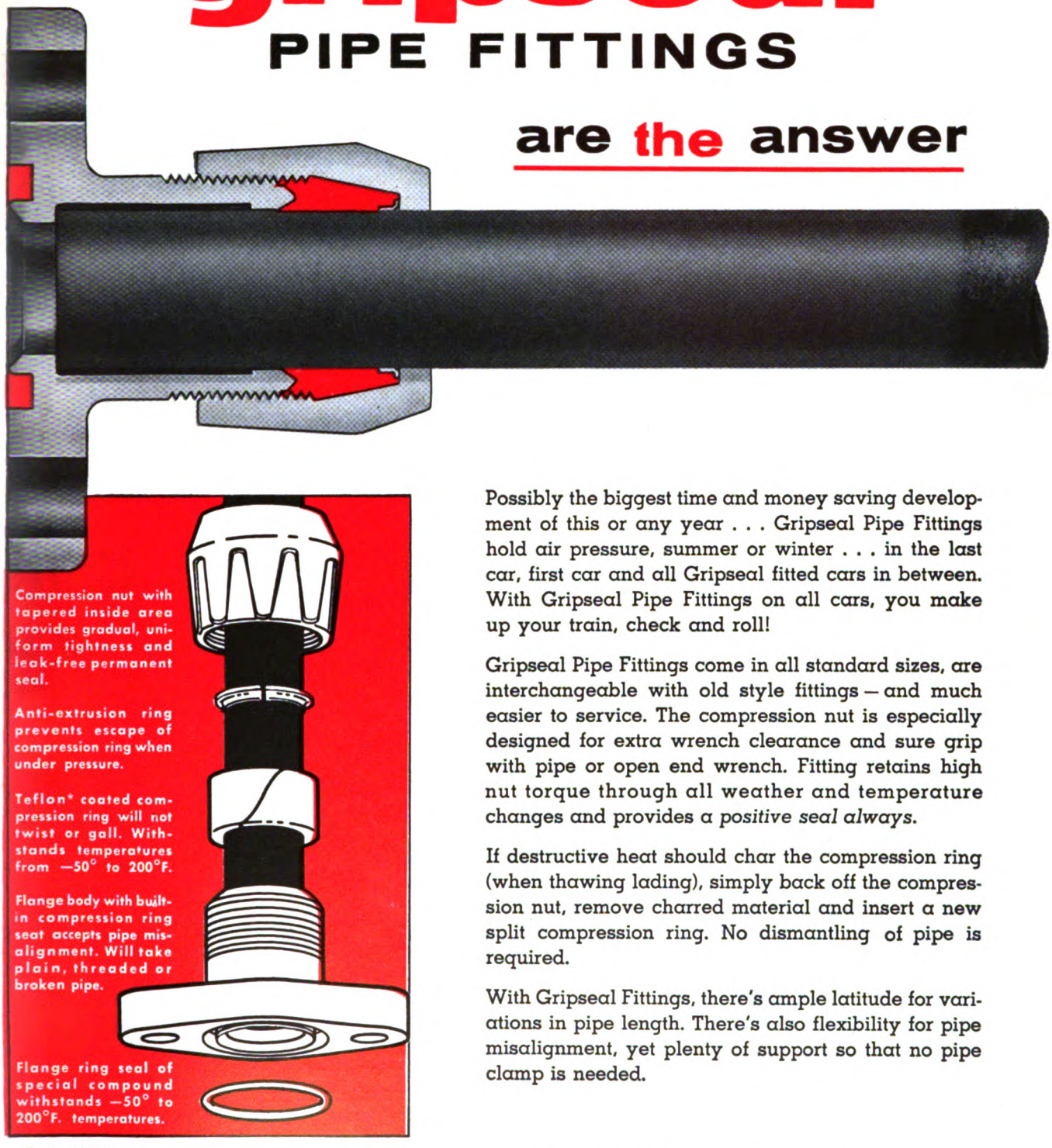

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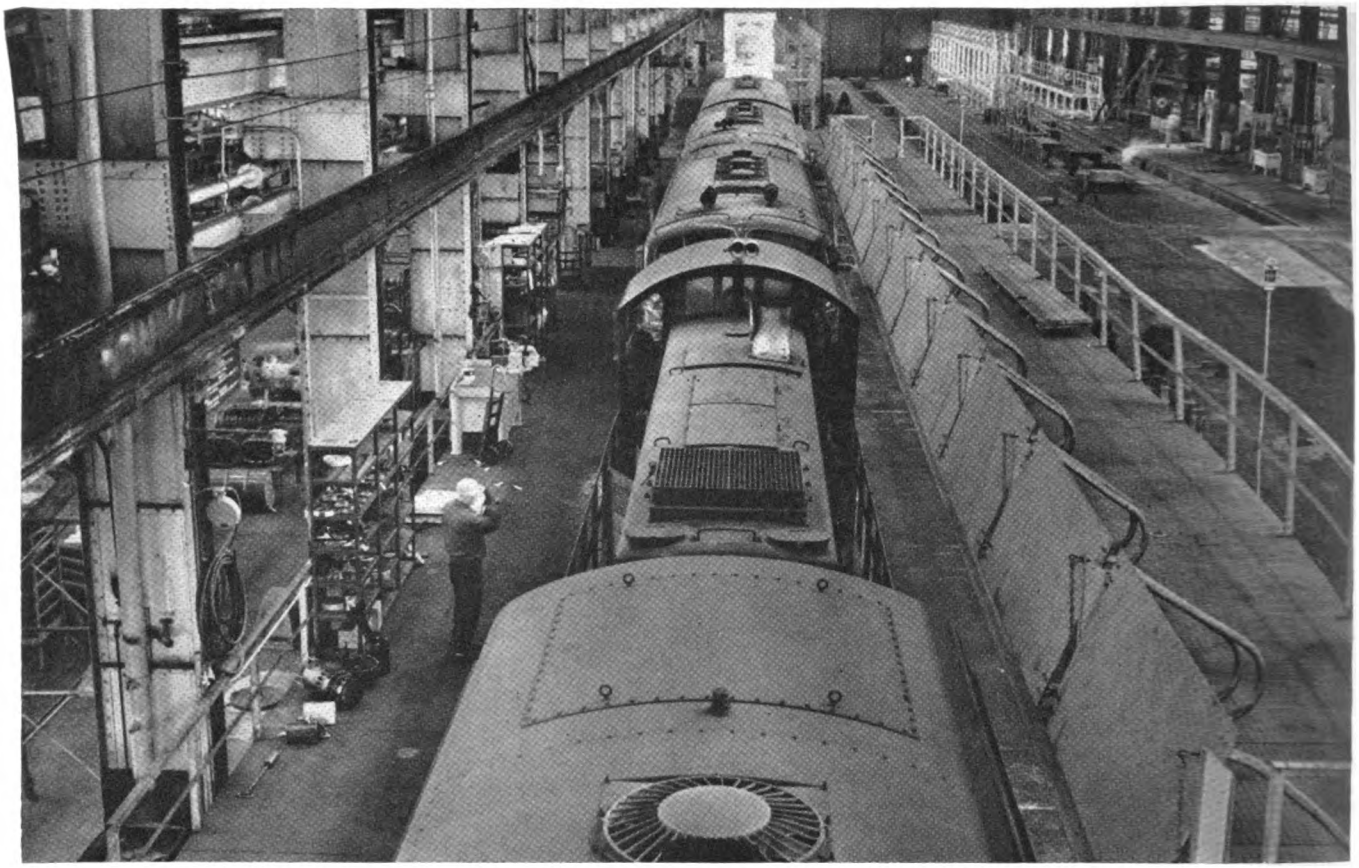
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Five of the seven spots are inside the shop, a building formerly part of the Cumberland heavy-repair facility.

Spot Shop to Maintain 540 B&O Units

Half of road's motive power is to be handled at Cumberland when program's last phase is complete.

A spot repair facility established by the Baltimore & Ohio at Cumberland, Md., will be performing the ICC inspections and preventive maintenance on approximately half the road's motive power.

Since May 1, the seven-spot facility has been responsible for monthly work on 375 units which include Alco road freight and yard units, and General Motors road freight and road switcher units. The B&O motive-power department has successfully solved the problems of maintaining several types of units produced by two builders on the same progressive maintenance line. This is done without changing the working time at the spots, with almost no changes in manpower assignments and with no attempt to classify units so that only one type, or those produced by one builder, would be on the line at any given time. Instead, units go through the seven spots as they are received in Cumberland and each unit remains at each individual spot for 70 min.

All this is the result of exhaustive studies made under the direction of F. B. Rykoskey, chief mechanical officer, and W. A. Mullen, superintendent of mechanical methods. The first phase of the program was initiated in March when 261 units were assigned to Cumberland for progressive work on a single-shift, seven-days-per-week basis. Addition of a second shift on May 1 brought the assignment to 375 units. This summer, a third trick operation will be started and the assignment of units will be increased to 540.

The shop, a portion of the former Cumberland back shop, is 505 ft long. Spots 2 through 5 are within this building. Spot 1, for preliminary inspection, is just outside the building where units can be given initial checks with engines running. Spot 7, also outside, is adjacent to the door through which units pass as they leave the shop building.

At the seven work stations the following operations are performed:

Spot 1. Inbound running inspection.

Spot 2. ICC inspection and examination of crankcases and air boxes and mechanical running repairs.

Spot 3. Truck repairs, electrical and mechanical running repairs, and lubrication.

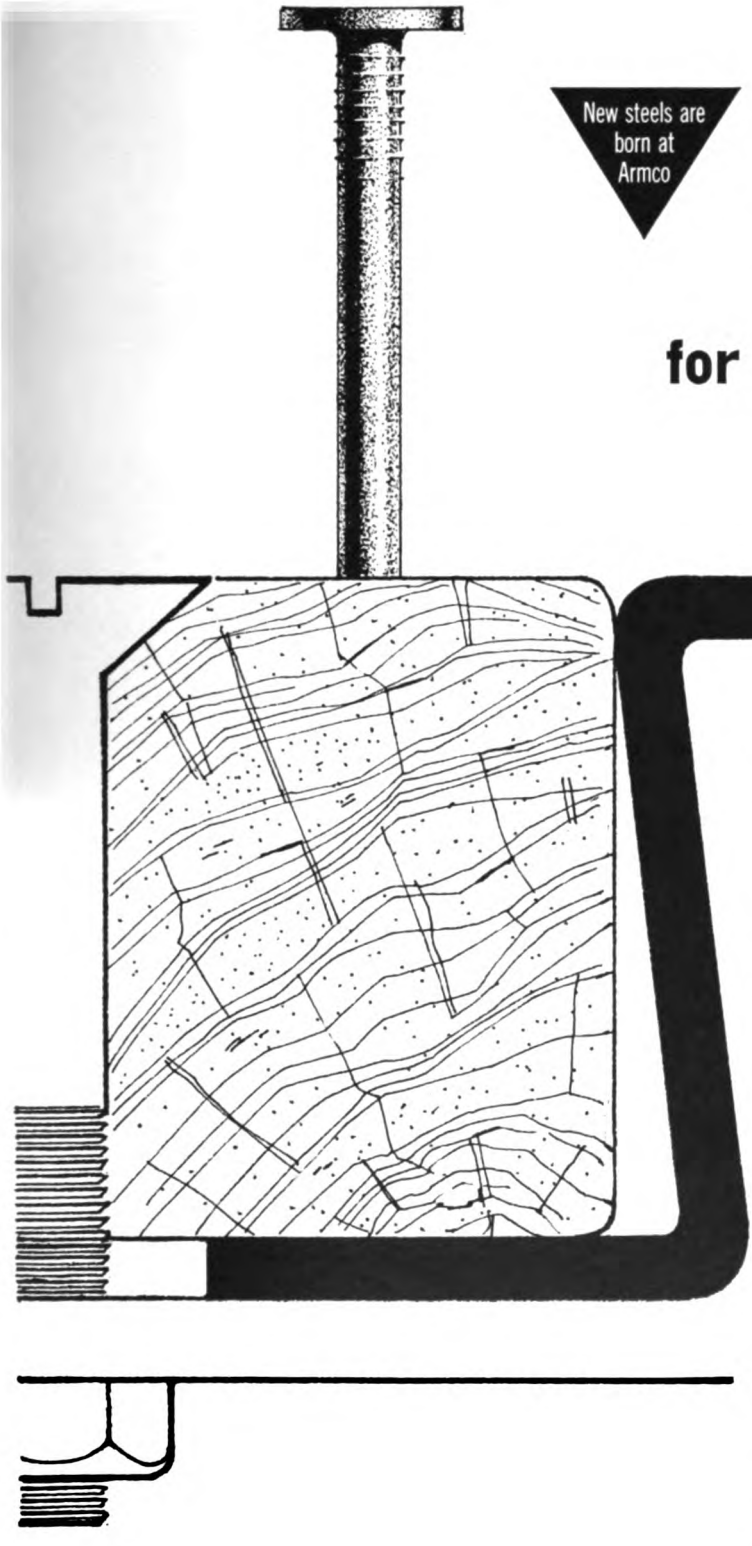
Spot 4. Coupler, draft-gear and carbody work, plus drop-pit work, if necessary.

Spot 5. Replacement of engine and carbody air filters and electrical and mechanical running repairs.

Spot 6. Final ICC inspection, both electrical and mechanical.

Spot 7. Thorough interior and exterior cleaning of locomotive.

(Continued on page 35)



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GREAT NORTHERN



Thirty-six General Motors GP-20's speed freight on the Great Northern . . . race westward across the plains from St. Paul, climb the Rockies over 5211 foot high Marias Pass, and pull through the eight mile Cascade Tunnel into Seattle. Added capacity enables three GP-20's to replace four older units.

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GENERAL MOTORS LOCOMOTIVES





R. M. Shaver

The Unitized Underframe... How Important is it to the Railroads and Their Revenues?

How important is the unitized underframe? "Very," says carbuilder Shaver. Here are the reasons why.

Q. Mr. Shaver, the automotive industry has talked about the "unitized" auto body for quite some time. Railroaders and carbuilders often refer to "unitized" construction. Does it mean the same thing?

A. Somewhat. Except that when we talk about it we are not quite so inclusive as the automotive people. We are usually discussing a unitized component of the freight car, normally the underframe. They mean the entire structure.

Q. Are the advantages of the unitized freight car underframe generally the same as with automotive construction?

A. Our problems differ, of course, but the general advantages we are able to achieve are about the same. They grow out of the definition of unitizing. That is: A structure that is designed as a unit and manufactured as a unit . . . consider it as a balanced, major car component if you will. I think this is the important qualification to keep in mind . . . *balance*. The all-welded, unitized underframe provides a good balanced structure where each member is designed to work *with* each other and balanced to work with the rest of the car components.

Q. How about some specifics?

A. Every piece in the underframe, every part from striker to bolster, through center sill to crossbearers and stringers, must be designed so that it works best with every other part. Not in spite of, or individually, but *with* each part. This means that in engineering freight car underframes we must anticipate the strength requirements of each underframe part. Too much or too little strength in one part will effect other parts or areas. Again, we design the parts to work together and make them into an integral or "unitized" weldment.

Q. Could you relate this strength and balance to a particular underframe segment?

A. Yes, let's take the welded bolster and draft sill in the Pullman-Standard underframe. This area of the underframe must offer exceptional strength, but it must provide this strength within weight limitations that are appropriate to its function and to the service of the underframe overall. Cast units are rigid and strong, but usually require a heavy mass and weight of metal to gain their strength. This "beef", however, isn't the answer if you are going to achieve the most efficient product.

Q. Makes sense. Anything else?

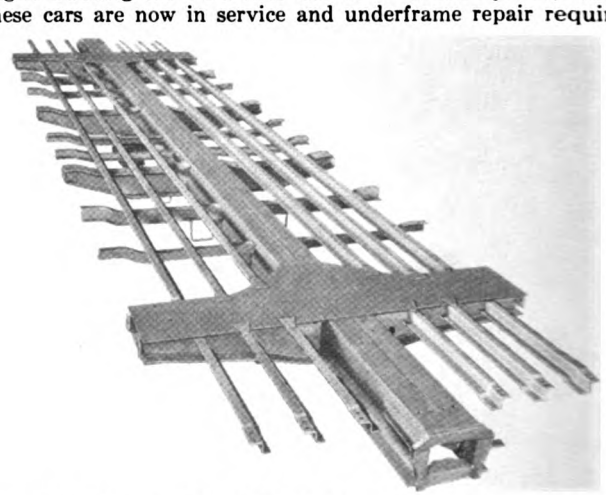
A. There certainly is. Flexibility at this point in the structure is extremely important. The properly designed bolster having properly engineered flexibility and capacity for temporary deflection must do its part—and it's a substantial one.

It must help relieve and properly distribute shocks over the remainder of the underframe and car. Too much stiffness here can cause the stress to "bunch-up" and damage the car structure at its bolster connection. Many times a heavy, rigid bolster and draft sill is not balanced with the rest of the underframe and simply acts as a transmitter of this excessive energy. Serious damage to structural members of the car body can result.

Q. How about over the long haul?

A. Here's where the biggest payoff comes in. In repairability, for example. Repairs to a welded structure are usually not hard to make. The tools, the craftsmen and the materials are in any railroad shop and available at most rip tracks. This isn't so in many other cases, for example, where repairs to cast units are involved.

And finally, and the most dramatic demonstration of the reliability of the unitized, welded underframe over the long haul, is the service record. Since we began building the welded draft sill units in 1935, we have built and put into service over *250,000* car sets of them. Welded draft sills and bolsters proved so successful they were made the standard when we began building the PS-1 Box Car in 1947. Nearly 100,000 of these cars are now in service and underframe repair requirements have been minimal. With this much service experience you know what to expect with the P-S welded underframe.



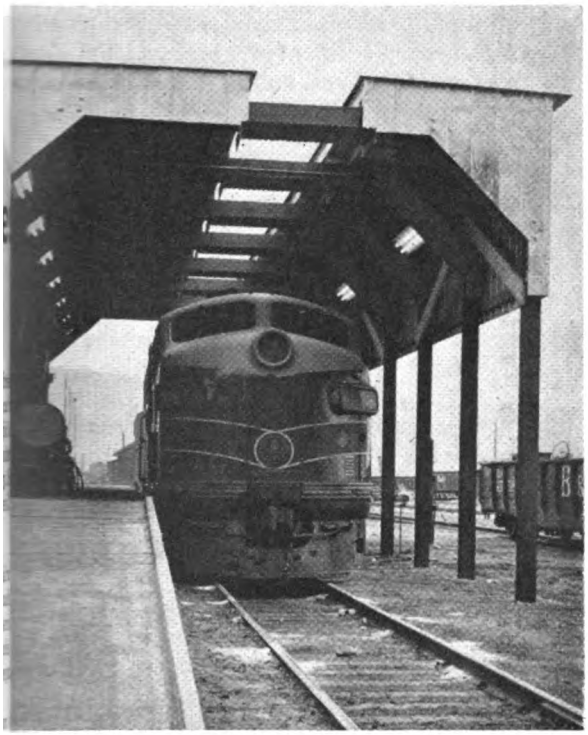
Q. What about improvements and testing?

A. This good service record didn't just happen. Our units are thoroughly tested, checked, changed where needed, retested and rechecked.

Our first all-welded underframe, which, over the years, has been constantly improved on, was probably the most tested freight car component ever built. The P-S Research & Development Department, and outside laboratories, did their best to find weaknesses, first in each part; then in the overall unit. Even the welding rod we use was tested. Incidentally, we still test each new shipment of welding rod. It's got to meet our specifications or back it goes. It's the design, experience and this attention to detail that make P-S welded underframes the best in the industry.

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Spot Shop to Maintain 540 B&O Units . . .



First spot on the line is this shelter adjacent to main shop door where units are given preliminary inspection.

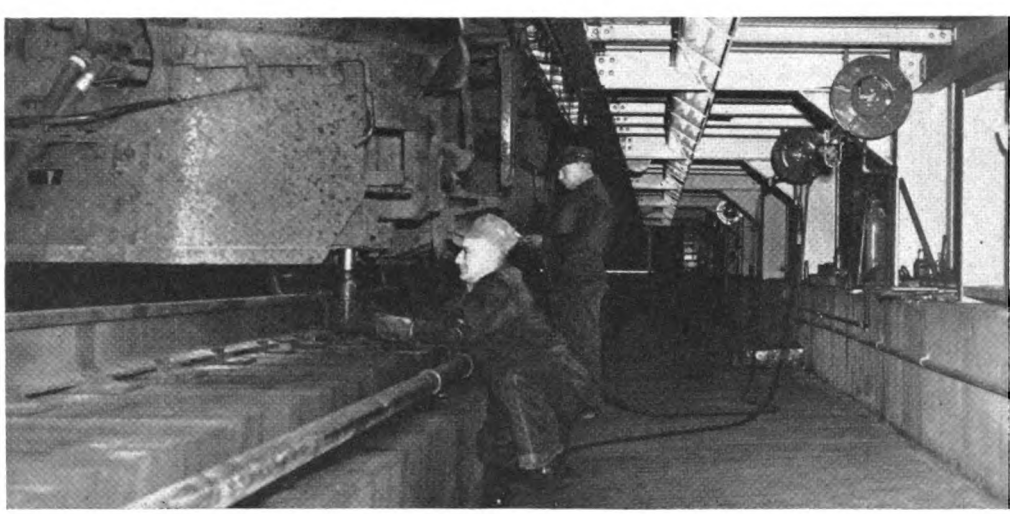


Storage racks for locomotive components and hose reels for supplies needed during servicing are conveniently located adjacent to the work sites.

(Continued from page 30)

While these are general descriptions of the jobs at each work station, there are some variations between the work done on different types of units. However, the handling of Alco and General Motors units presents no unusual manpower, facility, or tooling problems.

According to Mr. Rykoskey, the centralization of diesel repairs on a progressive line basis is the most significant advancement in the Mechanical department since dieselization. This system has proved to give better maintenance quicker, at more economical cost. The overall out-of-service time for monthly maintenance has been reduced 50%.



Hose reels and supply racks are installed for use by men working on lower shop level. Work is arranged so there will be a minimum of interference between men doing different jobs.

Intermediate Work

Cumberland is virtually the "hub" of the B&O system, being the point where the Chicago and St. Louis lines diverge and from which eastward trains operate to Washington, or to Baltimore, Philadelphia, and New York. The normal dispatchments at Cumberland average 115 to 120 units daily. Since this is the largest terminal on the B&O, the regular shopping of the locomotive units presents no problem. The most modern classification yard on the B&O has been constructed at Cumberland, and the yard locomotives from this facility are also handled in the Cumberland shop.

Normally, more than half the units assigned periodic for work do not return to Cumberland more often than once in 30 days. While it is intended that units will be prepared for this interval of service when they do come in, the B&O has found a certain amount of intermediate work is necessary. There is a "15-day" preventive maintenance cycle covering replacement of engine air filters, checks of traction gear and motor suspension bearing lubrication, and renewal of Alco lubricating oil filters. These jobs continue to be handled at any terminal where units are inspected and fueled.

To keep locomotives moving in and out of Cumberland shop at the steady pace required by the progressive maintenance system makes essential very close coordination between the B&O's motive power and transportation departments. Because of Cumberland's strategic location, it is possible for all

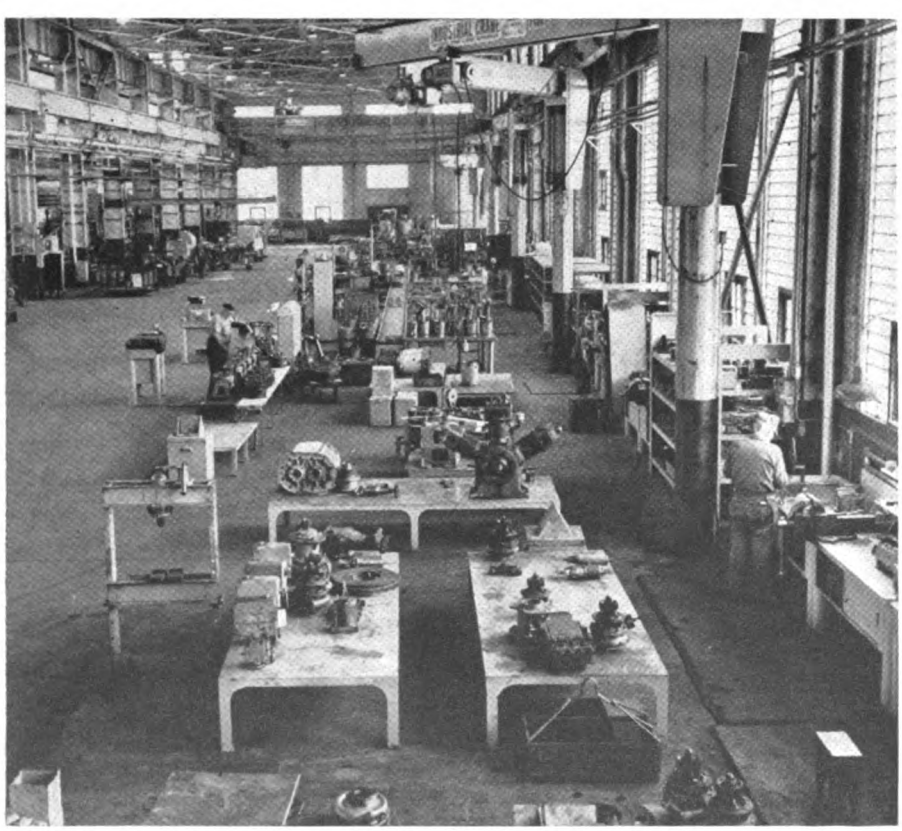
units to be worked into that point for period maintenance. Almost no deadheading or movement of light locomotives has been necessary since the new system went into operation.

It is also part of the plan that the progressive system will not be operated at any time when there are so few units that there will not be one at each of the seven work stations. To date, this has been no problem; the line has always been filled and has operated without interruption.

In addition to the preventive maintenance work and monthly ICC inspection which all units receive when they come to the shop, the quarterly, semi-annual, and annual ICC inspections are made as units pass along the line. It has also been possible to do some heavier and emergency repairs without interfering with the 70-min work intervals. These include periodic replacement of oil cooler cores which is done on a six-months' basis for all Alcos and on an 18-months' basis for GM units. Emergency repairs have included the replacement of individual power assemblies, air compressors, radiator cooling fans, dynamic brake grids, and traction motor and wheel assemblies. The pair of overhead cranes in the shop can be used for handling roof hatches, compressors, and similar items. The drop pit in the line makes possible not only the replacement of wheel sets, but also swing hangers and coil or elliptic truck springs.



Locomotive at Spot 4 was not placed on drop pit immediately behind it. B&O does make wheel changes and completes similar truck repairs with the drop pit during 70-min. work interval.



Parts reclamation area is adjacent to spot line. Components removed from locomotives are prepared for reuse. Men in this area work on the line when a unit is found to need special repairs.

The Work Forces

Along with construction of platforms and installation of new equipment in the shop and the shelter at the Spot 1 position outside, a work area was established where components removed on a routine or emergency basis could be cleaned, rebuilt, or repaired to make them ready for reuse. This area is staffed by a group known as the "support force" which is assigned to work on the progressive line when a unit is found to require emergency repairs, or when one is due for semi-annual or annual ICC inspection. When it is impossible to complete an emergency repair on the line, it is "set back" on another track in the shop and completed by the support gang.

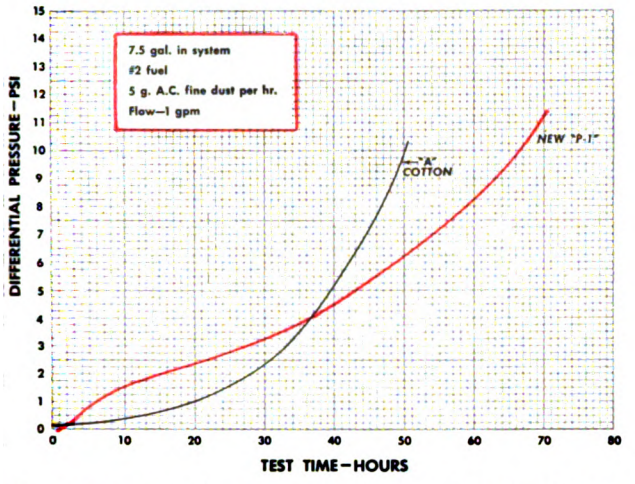
The regular force on the line consists of 22 men covering the seven work stations. These include five machinists, three machinist helpers, five electricians, one electrician helper, four pipe fitters, one carman, two laborers, and one foreman. Exhaustive planning has made it possible for the varied maintenance jobs to be completed without interference. By placing tools and materials at work sites, it has been possible to reduce non-productive time to a minimum.

All moving of units along the line is done by the unit coming to the No. 1 position. This locomotive moves into the shop, advancing all units from one work station to the next. Units are separated after being properly spotted, and the unit which does this is returned to the No. 1 station and is given the preliminary inspection before its engine is shut down. This move requires approximately 6 min. Because there are only five work stations in the 505-ft shop, any unit can be spotted without difficulty. The shop has a warning light and horn system which operates before, and as, the line is moved.

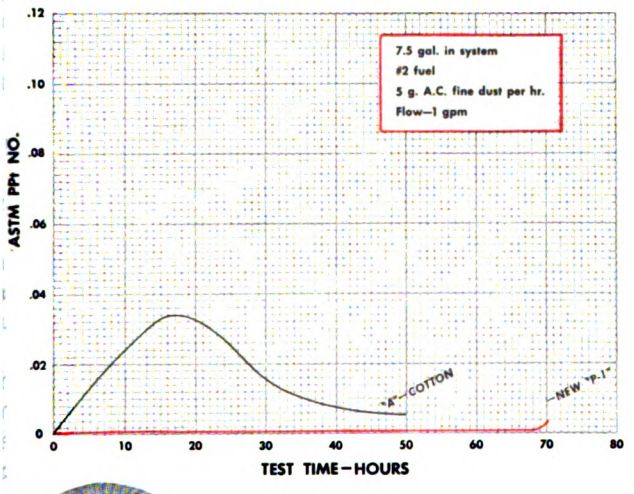
Work Station 4, which includes the drop pit, is long enough so a locomotive can be placed to remove any wheel set or truck without interfering with the units at the two adjacent work stations.

Applied Research in Filtration Saves Money for Railroads, too!

NEW CLEANLINESS IN FUEL AND LUBRICATING OILS EFFECTS MAJOR ECONOMIES IN DIESEL OPERATION



Test to demonstrate the comparative efficiency (retention of contaminants) and flow characteristics (pressure drop) of standard 2nd stage fuel filter cartridge "A" versus the new WIX P-1 pleated paper cartridge. With a condemnation limit of 10 psi, cartridge "A" indicates on the chart above a life cycle of 50 hours versus 66 hours for the new WIX development. Note that, throughout its longer service life, the WIX cartridge never exceeds trace amounts as opposed to the performance of cartridge "A" as shown on chart below.





Shown at the left—WIXITE Primary Fuel Filter Cartridge. At the right—the New WIX P-1 Second Stage Fuel Filter Cartridge whose outstanding performance is pictured above.

When a few specks, no larger than the point of a pin, can disrupt the entire schedule of a railroad system, the economic importance of clean fuel oil is well illustrated — but, in only one of its aspects. Engine trouble, caused by fuel failure, is a catastrophe. The day in and day out erosion of vital engine parts, which is the progressive penalty of contaminants in lubricating oil, may be equally costly. Combined, these problems represent significant sums in the annual operations budget.

Research and development by WIX, based on years of study, have made marked progress in the areas of both fuel and lubricating oil filtration. WIX Filter Cartridges were the first to supplant the old hand-filled waste packed filters which today are pretty generally recognized as "extravagant" economies.

Today WIX offers comprehensive coverage of all oil filtration needs on diesel locomotives . . . lubrication, primary and secondary stage fuel. This coverage embraces many filtering media so that engineering can prescribe the precise filtering formula to suit the engine and its characteristics as well as the service or environment in which it operates.

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These five pennies, during a 12-year period, more than covered all part replacement costs on an average

NATIONAL

Ever since the introduction of the first C-1 truck over 12 years ago the basic design has remained unchanged. Today's National C-1 Trucks are still the original design—*a design that was right to start with.*

Here's proof of the correctness of that design.

In spite of the fact that many of these trucks have covered hundreds of thousands of miles, our service parts sales records show an average replacement rate of an extremely low .00129% for wedges, wedge springs and wear plates.

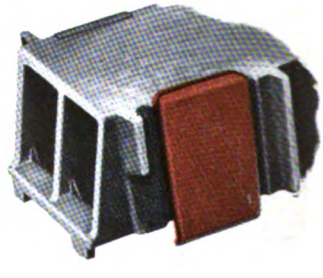
This represents an average replacement cost of only $.0985 per carset—*less than 5 cents per National C-1 Truck in service!*



wedges
.00131% replacement

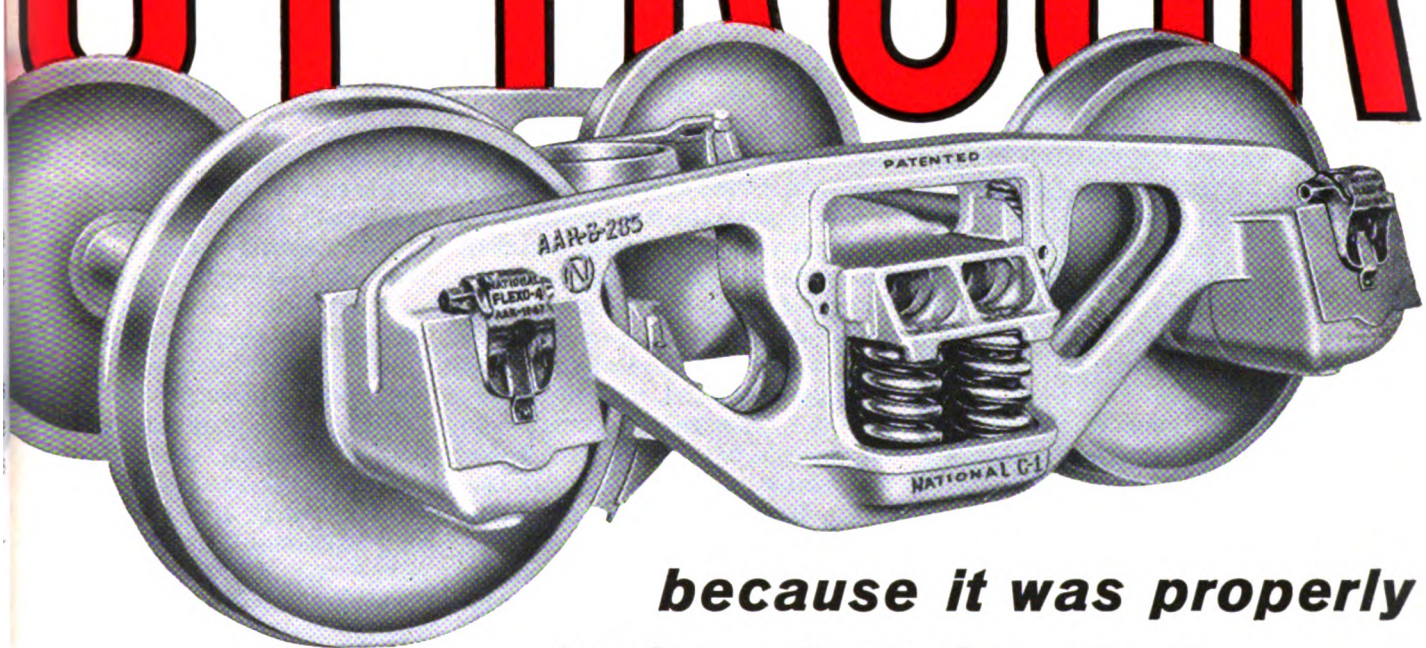


wedge springs
.0019% replacement



wear plates
.00064% replacement

C-1 TRUCK



because it was properly designed at the start

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STEEL CASTINGS — DESIGN WITH STRENGTH IN MIND — Centennial 1861-1961

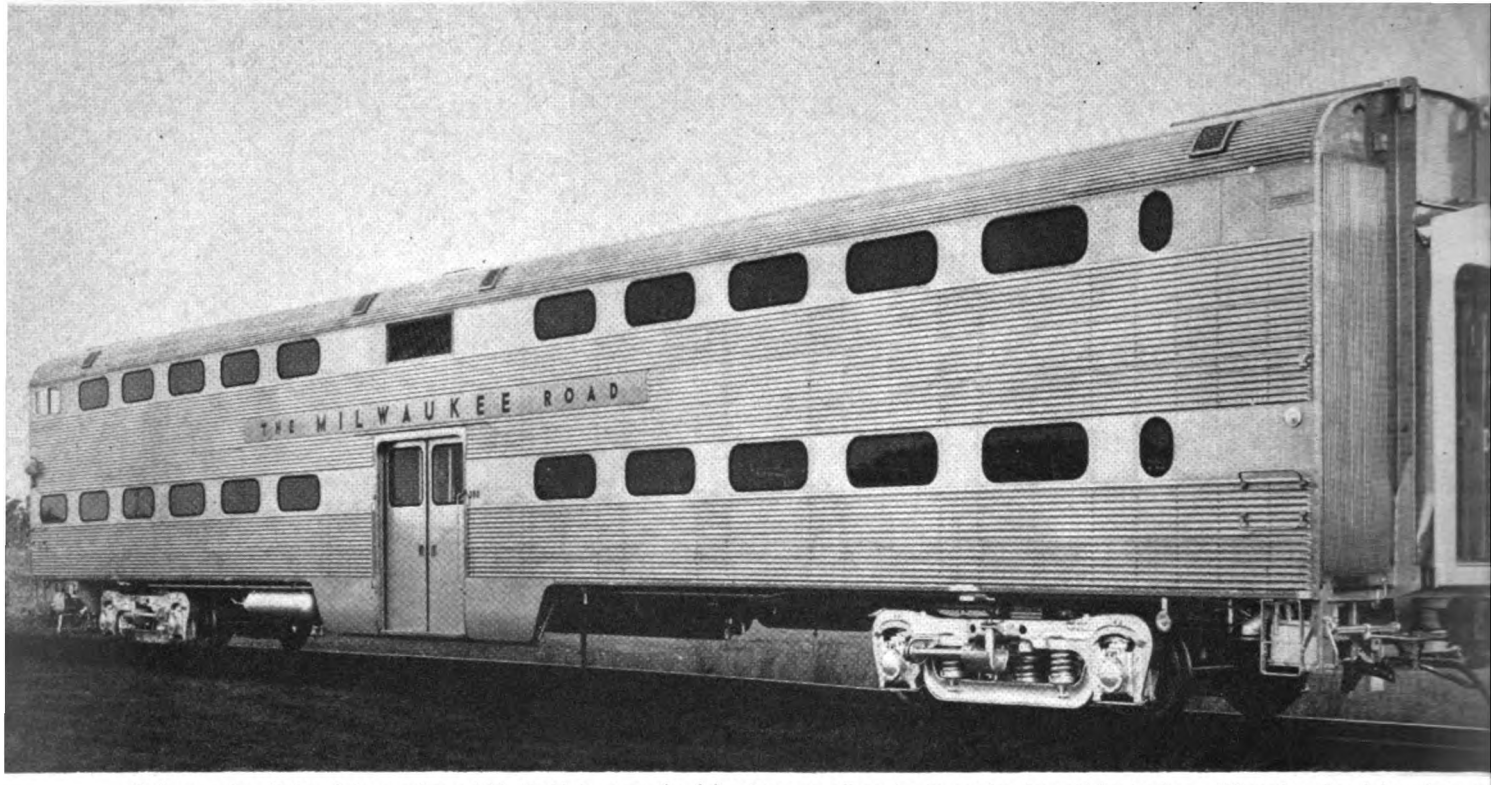
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High-capacity, lightweight coaches which Budd is currently delivering are all to be in service by mid-September. Milwaukee Road has become fourth U.S. Line to adopt the gallery-type car for commuter service and the second to acquire cab-control cars for bi-directional operation.

Milwaukee Puts Stainless-Steel Cars

The first stainless-steel gallery-type, push-pull cars have just been put in service by the Milwaukee on its Chicago area suburban lines. Budd is currently delivering eight cab cars and 32 trailers. The Milwaukee is to power its new trains with six 2,400-hp E9, four 1,750-hp F9, and three 1,500-hp FP7 locomotives.

All power requirements of the cars —air conditioning, heating, lighting, door controls and battery charging— are supplied directly from the locomotive through a 480-volt, three-phase, 60-cycle distribution system which is trainlined through all the cars. Each of the locomotives to be used in the bi-directional service has been equipped with an alternator powered by a 600-hp Cummins diesel.

Bi-directional operation gives to locomotive-powered trains the flexibility and high availability which is a characteristic of electric multiple-unit train operations. Either arrangement makes possible rapid turn-around.

Each cab car is equipped with a locomotive-style cab and standard locomotive control station at one end of the gallery, or upper, level. All cab and trailer cars are equipped with complete electric train lines of the same type used through multiple-unit diesel locomotives. This makes it possible to transmit necessary control signals from a cab-car cab at one end of a train through the train to the diesel locomotive at the other end. Standard Milwaukee operation, like that of the Chicago & North Western which originated the push-pull concept in the U.S., will be to have a cab car on the Chicago, or inbound, end of each of its push-pull trains and a locomotive on the opposite, or outbound, end. Trains may also have intermediate cab cars within their consists. Shorter trains may then be operated in non-peak hours simply by splitting one of the longer rush-hour trains at an intermediate cab unit and leaving unneeded cars in the station.

Diesel-traction equipment on the eight cab cars includes a standard GM locomotive controller, standard 26-C cab air-brake equipment, and controls for air horn, bell, windshield wiper, headlights, sanders, and similar equipment. The cab end of each of these cars is fitted with headlight; oscillating type, red rear warning light; body-mounted pilot; two-chime horn; bell, sanders and electrically heated windshields.

The gallery-type commuter-car design originated with Budd which built 30 of these coaches for the Burlington in 1950. In 1959, the C&NW ordered the first push-pull bi-level cars and has since embarked on a program which is now completely replacing all conventional commuter cars with 200 bi-level, high-capacity cars.

Ready-to-run weight of the new 156-passenger Milwaukee cab car is 106,680 lb, and weight of the 162-passenger trailer is 100,740 lb.

Both types of cars have a standard Budd stainless-steel center sill extending between bolsters and terminating at each end in an arc-welded, low-alloy carbon-steel end underframe unit. Outer ends of each end underframe unit are welded to the car's end framing, while the ends of its integral body bolster are welded to the side sills. In addition to the bolster, there are four stainless-steel cross-bearers which are also welded to the channel-shaped side sills.

Topping the stainless-steel sub-floor in the passenger compartments are ½-in. plywood panels which are covered with Terraflex vinyl asbestos tile flooring. The sub-floor is insulated with a 3-in. thickness of fiber glass. The tile-covered gallery, or upper level, floors are 1-in. metal-faced plywood supported at the walls by continuous brackets attached to the side posts and at the aisles by longitudinal members extending from the stair wells to the

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ab seats	Coach & Car Equipment
inyl-coated steel	United States Steel
Seat covering	United States Rubber
Doors and interior panels	United States Plywood
Lavatories	Crane
Light fixtures	Trans-Lite
Door operators	National Pneumatic
Glass	Libbey-Owens-Ford Pittsburgh Plate Glass
Water cooler	Ajax-Consolidated
Air-conditioning equipment	Trane
Heating equipment	Vapor Heating
Filters	Farr
Jumpers and receptacles	Albert & J. M. Anderson Joy Manufacturing
Wire and cable	Anaconda Wire & Cable
Batteries	Electric Storage Battery
Lettering and numbering	Minnesota Mining & Mfg.
Warning lights	Mars Signal Light
Speed indicators	Barco Manufacturing
Sanding controls; bell ringers	Prime Manufacturing
Warning horns	Leslie



Cab car has pilot, headlight, and standard horn and bell. All cars have electrical jumpers.

ommuter Service

ar ends. These longitudinal members lso form the passenger railings. The enter-car vestibule floors and steps re formed of diamond-pattern stainss plates. Walls and ceiling of this rea are also stainless steel.

The car's structure is designed as modified plate girder, using the sides s shear carrying members connecting ıe roof to the floor and serving as the ıord members.

Roofs, sides, and ends are insulated ith 3-in. thickness of fiber glass, ¾) per cu ft density. Interiors of the assenger compartments are lined ith textured-vinyl-covered galvaned carbon steel. End walls of the assenger compartments and the ainscoting, or side walls below the indows, on both levels have an Alerta green vinyl finish. The pier pans between windows and the walls bove are beige vinyl.

Windows are set in tan-colored ıolded plastic frames mounted in the ar structure. Windows are doublelazed units with graduated tinted lass, eliminating need for shades.

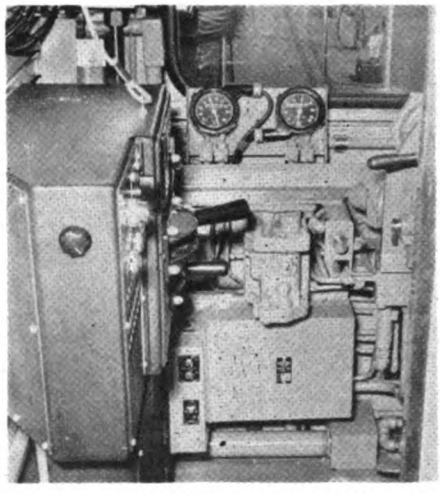
On the lower level, passenger seats re of the double throwover type, with inyl-plastic-covered, foam-rubber ushions mounted in chromeplated ıbing frames. Each of the four upeı level galleries has a combination of one-passenger flip-over seats adjacent to center stairway and longitudinally mounted theater-type seats.

Air conditioning consists of a pair of self-contained, electro-mechanical units mounted over the center vestibule. Each of the passenger compartments is cooled by one of these 8-ton, 2,400-cfm units. Air ducts for the lower level are formed by the raised platforms on which the upper level seats are mounted. Air is delivered to the upper level by a ceiling center duct running from the center vestibule to the end of the car, with branch ducts supplying the lower level.

In addition to the complete air conditioning, there is a Modulectric electric heating system which assures winter comfort. Each of the separate heating systems—one for each end of the car—consists of controls, a 12-kw overhead electric heater adjacent to the evaporator coil in the air-conditioning unit for heating the circulated air, and floor heat elements totaling 12 kw which provide radiant and convective heat at floor level along the outer sides of the car.

In each section of the car are a set of three thermostats and a temperature control panel. One thermostat controls the heating; one controls the

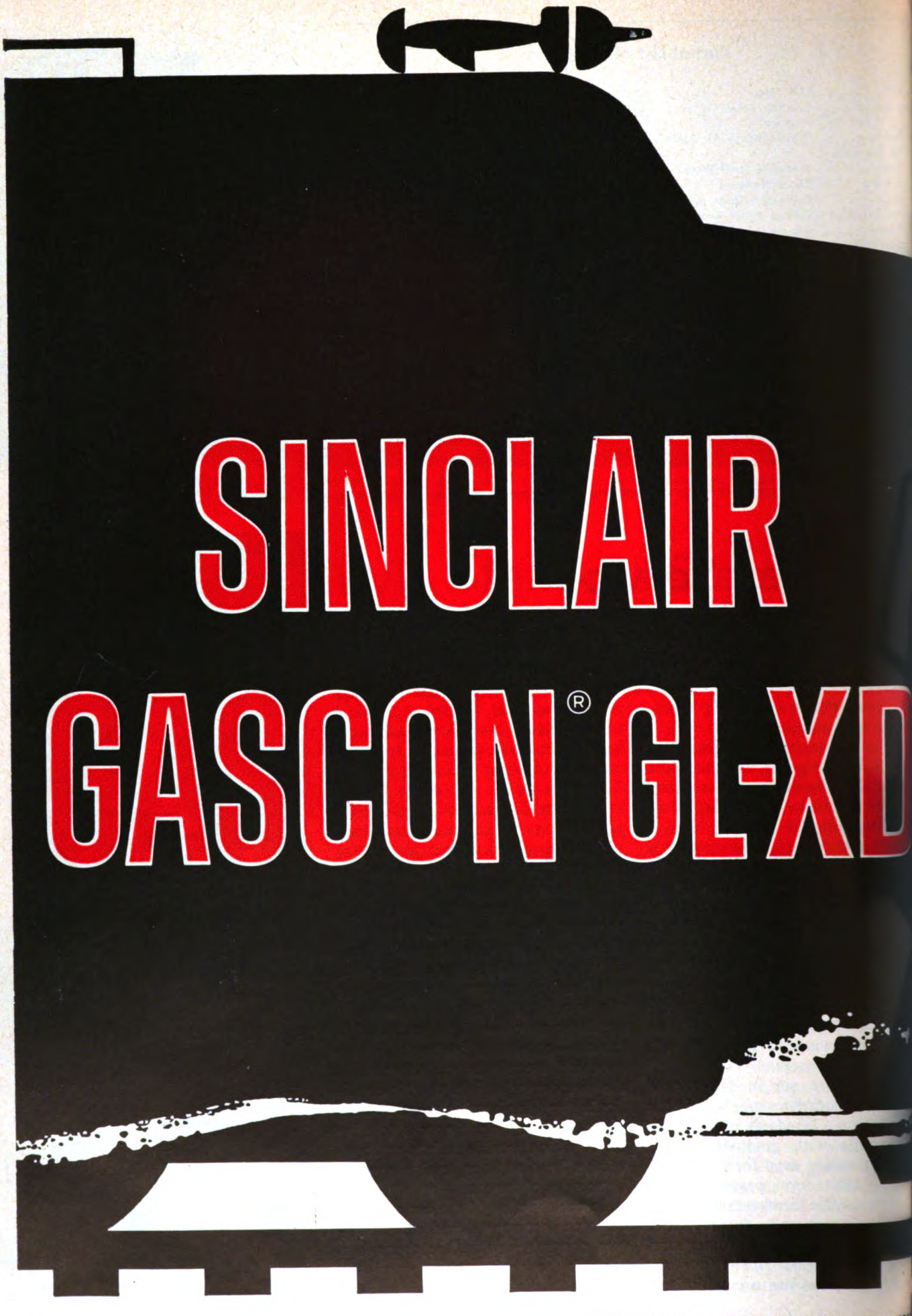
(Continued on page 58)



Cab-car equipment includes standard GM locomotive controller and 26-L brake valve.



Bright and well lighted interiors of new cars are proving popular with commuters.


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GASCON® GL-XD



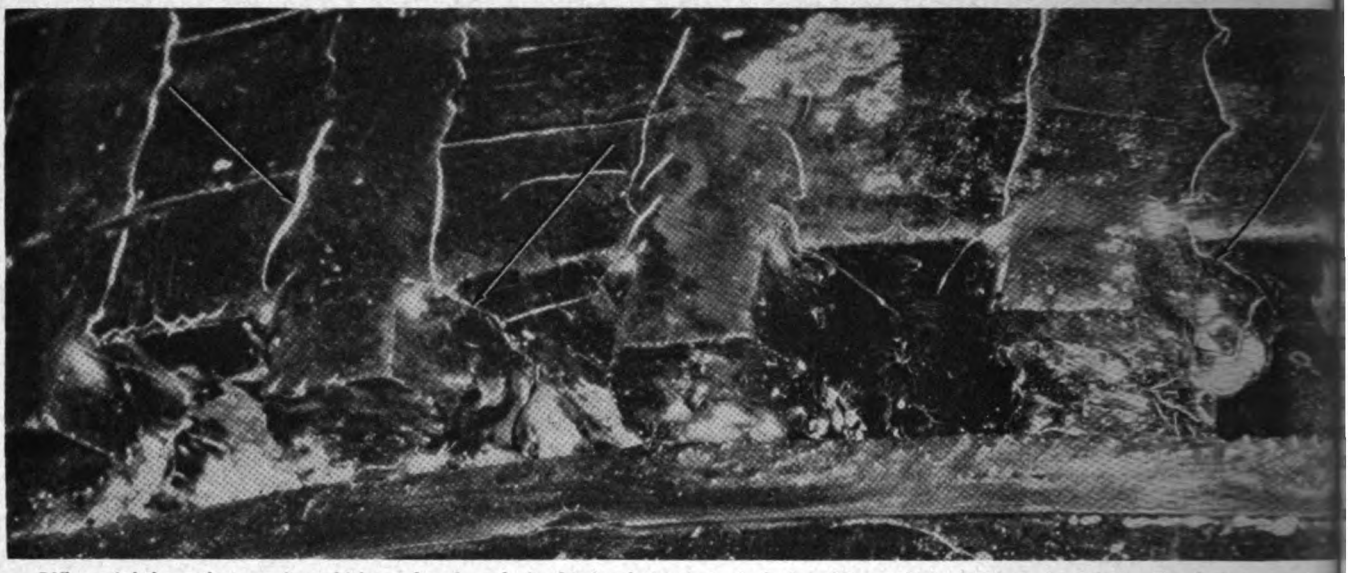
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Differential thermal expansion which produced cracks in this insulation is typical of problems which must be solved during the design process.

Developing Traction-Motor Insulation

Locomotive development has been accompanied by a constant demand for more power. Horsepower per traction motor has steadily increased, although physical size and basic design have not changed. Higher outputs have been attained principally by going to higher locomotive speeds while retaining substantially the same torque values. This generally means much more severe mechanical shocks and vibration, but no great difference in maximum motor temperatures.

Railroads have shown growing concern about maintenance costs — a multi-million-dollar item. This has led to demands for a "million-mile motor." Quality of new motors is not the only concern. Railroads are also anxious to upgrade their old motors:

- To increase motor life on present applications;
- To fit motors for higher horsepower on upgraded locomotives.

A careful analysis of the fundamentals of insulation system design is needed to evaluate both new designs and insulation practices for maintenance of existing traction equipment. The "million-mile motor" concept implies no basic overhaul during that length of service and practically no premature failures. In designing for this goal, first cost and maintenance cost must be balanced so that the total is a minimum. The interrelation of electrical and mechanical requirements and the influence of maintenance practices are both important.

Progress in traction-motor insulation systems does not come easily. Different insulation systems must be analyzed, considering both insulation and conductors. Further evaluation should involve laboratory tests and, then, engineering tests on completed machines. Field tests should then be used for final evaluation. Field tests require close cooperation between the manufacturer and the railroad. Tests must be carefully designed to produce true comparisons. They must be closely followed even though this is difficult, because the locomotives operate over many miles of line. In spite of these obstacles, careful field tests are essential to the progress of any insulation development program.

Electrical requirements for traction equipment are modest (about 25 volts per mil). Normal insulation resistance must be high enough to prevent ground relay operation. A small leakage current is to be expected, even on a new, clean, dry motor. This will increase in service as creepage surfaces become contaminated.

The more exposed insulations in and around the commutator chamber should be arc resistant. For example, cotton is better than glass for string bands, because glass becomes conducting at low red heat, tending to prolong the flashover arc. Teflon is superior to porcelain, mycalex glass, or plastic for brushholder insulators.

In most applications traction apparatus is subject to rapid load changes and may operate considerably above the continuous rating for several hours. Design must be based on long service life, rather than AIEE classifications. Two motors designed for the same application may be equally satisfactory, although not identical in material and construction.

The rather modest electrical requirements must be met under conditions of very severe mechanical and thermal abuse. Resistance to thermal degradation, the most obvious requirement, is recognized by AIEE standards. In this respect, glass is preferable to paper and silicone varnish to alkyds or epoxies. The design is balanced by allowing greater temperature rise on fields to offset the more severe mechanical stresses experienced in armatures. Insulation deteriorates at a rate which increases exponentially with temperature.

In addition to thermal degradation insulation is subjected to mechanical stresses, such as flexing caused by shaft bending and core deflections, vibration generated by faulty gearing, torsionals caused by the motor bouncing on its nose support, and expansion caused by temperature increases.

Maintenance practices also affect insulation life. Motors and generators may be cleaned in place to increase insulation resistance. This can do more harm than good. Dirt may be washed into inaccessible cracks and corners

First of two installments based on a paper presented before an AIEE Land Transportation Committee meeting by J. K. Wentz and R. M. Lukes of the Locomotive and Car Equipment Dept., General Electric Co.

here it cannot be removed and may use solid grounds. Wiping dirt off e string band and brush holders will ually raise the insulation resistance the machine appreciably without de-siting dirt in cracks and without ntaminating the commutator and ushes. Cleaning equipment after re-oval from the locomotive is best ne in a degreaser. Here, the quan-ies of solvent which condense on the rface are so great that the dirt is shed away instead of being de-sited in inaccessible spots, or with-t causing deterioration of the insula-n.

arious Insulations

Recognition of the continuing in-ease in the severity of the require-ents for traction-motor insulation has d to the formulation of a specifica-n for the insulation of the future. any polymeric materials have been died in the continuing search for w insulating materials.

Alkyd resins (Glyptal) have been ed with mica, glass, varnished cam-ic, and other materials. In general, e alkyds are being replaced with ma-ials which have greater thermal sta-lity. Polyesters have found consider-le success in making an improved sulation system, because of their ermal stability, moisture-proofness d hydrolytic stability.

When first developed, silicones emed destined to replace polyesters d alkyd resins with a truly high-mperature stable resin having ex-llent electrical properties. Attempts completely insulate traction ma-ines with silicones have shown good ermal conductivity, but also limita-ns such as low cut-through strength d reversion.

Teflon appeared promising because high thermal stability, chemical in-tness, and low surface energy. A traction motor insulated with Teflon in 1950 failed after only a few days in test. Poor cut-through strength of the Teflon tape caused failure between coils. Considerable laboratory work was done in an effort to develop a process for applying Teflon directly to copper conductors. Two armatures wound with Teflon insulated coils failed because the material was unable to withstand high mechanical pressure at operating temperatures.

Glass has the advantages of mechanical strength, reproducible quality of product, high thermal endurance, high moisture resistance, good oil, acid and solvent resistance, and good electrical properties. It has been evaluated for insulation use as flake-glass paper, glass beads and glass fabric. Beads having high electrical quality can be used as spacers in coils. Glass reinforced plastics are increasingly used in slot wedges, armature bands, and laminated structures. Considerable study has been made on glass finishes to obtain better adhesion of the resin.

While freshly formed samples of the urethanes have good moisture resistance, rapid deterioration occurs at temperatures experienced in traction motors. Melamine resins have some advantages for use in slot wedges; but difficulty of machining offsets them. Epoxy resins have excellent electrical properties, moisture resistance and thermal stability, and readily compound or mix with other types of materials. Pure epoxy resins are generally hard and brittle. Considerable work has been done to make them more flexible, but certain properties are sacrificed in the process. Epoxy resins can be "flexibilized" to the point where they become soft and cheesy, or they can be flexibilized to a lesser degree so that they still retain reasonable mechanical strength.

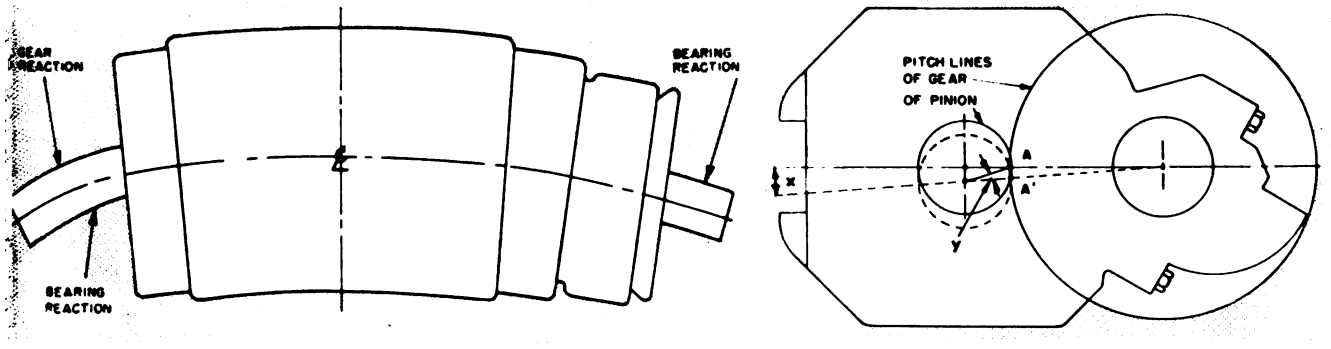
Traction service subjects insulating materials and systems to many different stresses. In seeking to use insulation most advantageously and provide for its best maintenance, a detailed examination of these stresses and their effects is in order. These can be classified generally as heat, moisture, chemical, and mechanical stresses.

Continued cure. The cure of an insulating varnish or resin involves a process of polymerization or gelation in which the relatively small molecules of the uncured material join together to form a large interconnected network that is essentially one large molecule. The degree of interconnection is a measure of the cure. The precise nature of the varnish or resin determines whether or not there are by-products during curing. In most materials, as for example alkyd resins and phenolics, the extent (tightness) of cure advances with time. This advance, accelerated by heat, eventually results in brittleness. As a general rule, polyesters cured by peroxide catalysts are not as sensitive to this process. Epoxy resins lie somewhere between silicones and polyesters, which are most resistant, and phenolics and alkyds.

Oxidation. Practically all traction insulation operates in contact with air. The rate of reaction with oxygen and the effect of this reaction are important. Generally, the result of oxidation is brittleness and eventual disintegration. The most oxidation-resistant materials seem to be the silicones and some of the phenolics and polyesters. Epoxy resins vary quite widely in sensitivity to oxidation. In traction equipment, the hottest parts are "buried" the deepest and have minimum contact with air. The hottest materials do not necessarily suffer most from oxidation.

Thermal degradation. In insulating

(Continued on page 48)



echanical stress, such as the flexing caused by the bending of the shaft during operation, can damage insulation (left). Torsional stresses can be nerated when motor bounces on its nose support. The frame swings through angle X and the armature jerks through angle Y. These forces must be nsidered along with the electrical and thermal stresses to which the insulation is subjected.



*As this advertisement goes to press, there are 75,150 Timken bearing-equipped cars in service or on order.

Two sides of

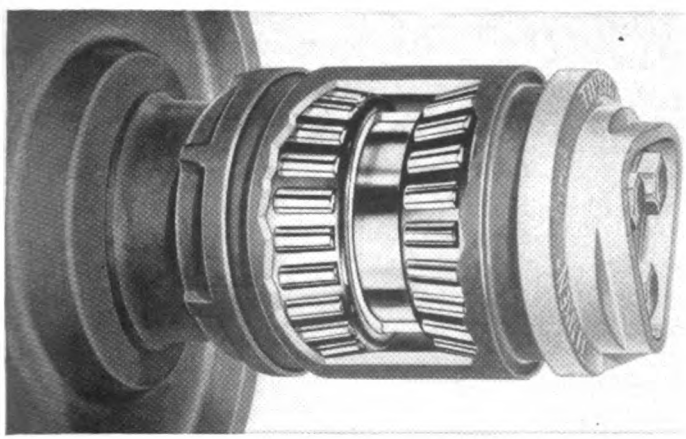
Railroads are buying increasing numbers of freight cars on Timken bearings only because Timken bearings are giving them performance no other bearings have ever delivered. Timken bearings help the railroads hold to schedules while cutting maintenance and operating costs. They help railroads realize more revenue from each freight car, make practical more costly specialized cars.

Timken heavy-duty "AP" bearings are tapered to roll the load, practically eliminate friction. And because of their precision manufacture and superior steel, they deliver more mileage with less maintenance.

Now 99 railroads and other freight car owners have over 75,000 Timken bearing-equipped cars in service or on order. They're out to solve the hot box problem, give even better service, and make more money per car. Now's the time to make the switch to "Roller Freight". The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO".



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(Continued from page 45)

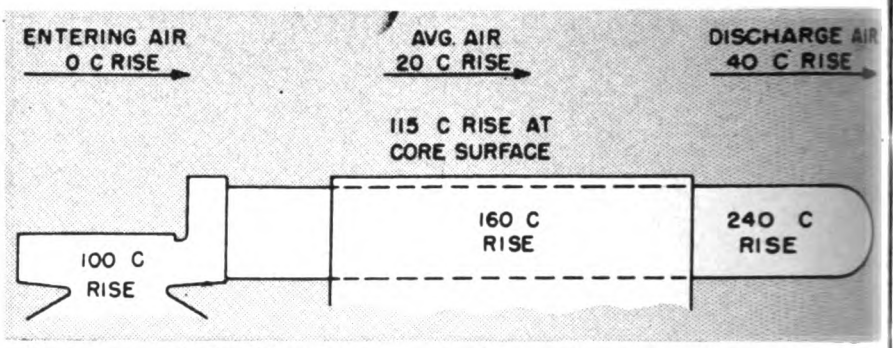
materials, the rupture of carbon-oxygen bonds and carbon-carbon bonds by heat is particularly serious when dealing with materials, such as cellulose, containing the hydroxly group. Silicones are highly resistant to thermal degradation and, to a lesser extent, so are polyesters and alkyds in the absence of air. Epoxy resins vary quite widely. Some epoxies, when cured, have a large number of hydroxly groups in the structure and tend to dehydrate at elevated temperatures.

Thermal softening. All varnishes and resins soften with increasing temperature. A measure of this is the heat distortion point, called more formally the flexural deformation temperature (FDT). Its value is the temperature at which a standard bar of the material in question, when heated at a standard rate, takes a standard deformation when loaded with a standard weight. Unfortunately, FDT gives no information whatsoever about the strength at higher temperatures. Actual measurements have demonstrated that two different materials having the same FDT can have widely different strengths at somewhat higher temperatures. It is important, therefore, not to judge a material by FDT alone, but also by the extent to which it maintains its strength above these temperatures. It has been demonstrated that the tighter the cure of a resin, the higher the FDT is likely to be, but it must be borne in mind that brittleness also increases.

Volatile by-products. Potential sources of trouble are gasses given off by some materials when heated. Silicones, under certain circumstances, give off volatiles that cause increased brush wear.

Electrical conductivity. Some insulating materials develop greatly increased conductivity at high temperatures. Glass, a highly ionized material, becomes quite conductive as it becomes more fluid. Care should be employed in using glass cloth or glass tape where arcing can cause a relatively short path to ground through the glass.

Hydrolysis. Rupture of chemical bonds by water is called hydrolysis. Most susceptible in insulations are the esters, which include polyesters, alkyds, and silicones. Epoxies cured with acid anhydrides are, in reality, polyesters and are subject to hydrolysis as are alkyds and conventional polyesters. Rupture of chemical bonds within the resin structure eventually leads to mechanical or electrical failure.



Air removes practically all heat from motors. Insulation must be designed for good transfer.

Swelling and softening. Mica, either as large splittings or as mica paper, delaminates under high humidity. In a system which depends for its integrity upon mica-resin bonds, high humidity can lead to cohesive failure of the mica and failure of the bond. Paper is very hydrophilic and, once having absorbed moisture, is very difficult to dry. A silicone coating may give excellent protection against liquid water, but very poor against water vapor. Even though epoxy resins are wet readily by water, they give protection against penetration both by liquid water and water vapor. This protection can disappear when, and if, the epoxy resin cracks.

Tracking. The formation of permanent conducting paths in plastic materials by the action of temporary conducting paths formed on the surface is known as tracking. Arc resistance differs from track resistance; tracking is caused by low-current discharges of relatively high potentials. Teflon is a good arc-resistant material, mainly because the surface decomposes and vaporizes under the heat of the arc and blows off the conducting contaminants and decomposition products.

Contamination and electrolytes. Repeated wetting and drying of insulation can lead to contamination by soluble electrolytes in the water, producing permanently low insulation resistance. The use of alkaline detergent cleaning solutions, a common maintenance practice, can cause permanently low insulation resistnce. If these cleaners are used, the minimum amount should be employed and rinsing should be thorough.

Catalytic decomposition. Resins used in insulation systems may decompose in the presence of certain metals. There is a strong reaction between copper and the peroxide catalyst in uncured polyester resins. The bond strength between resins and copper deteriorates at 180 C and above in the presence of air.

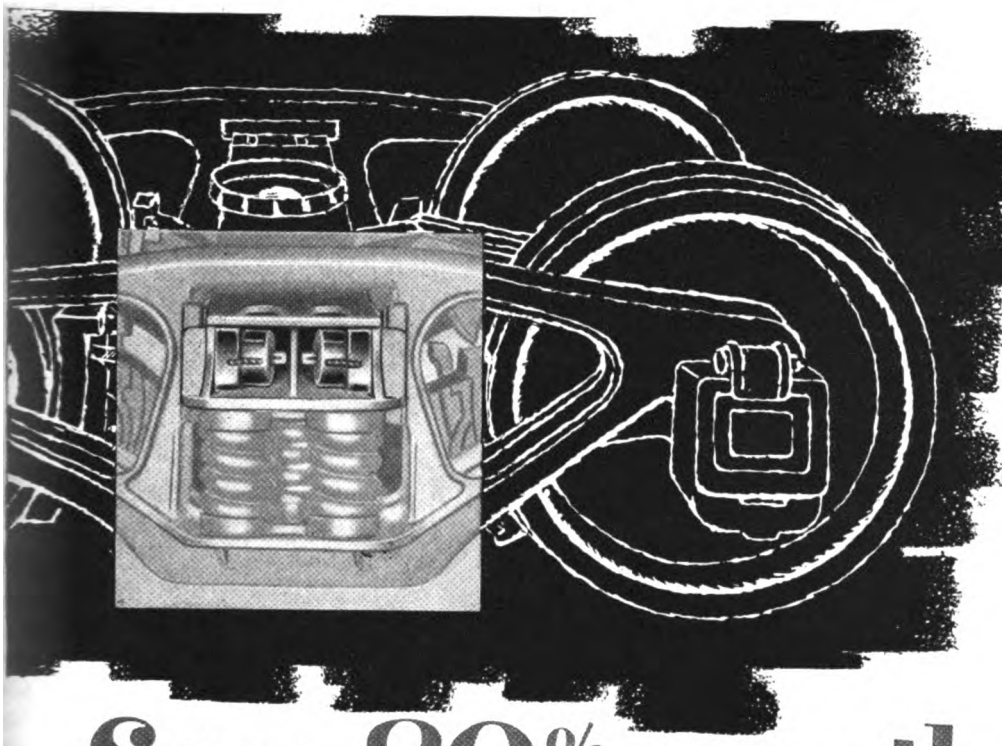
Organic solvents. Swelling and crumbling of resins and plastic materials can be caused by chlorinated solvents, such as trichlorethylene and perchlorethylene. Aromatic solvents, such as methyl ethyl ketone, acetone, toluene, xylene and benzene are quite injurious. Solvents, such as naphtha, kerosene, and gasoline, are rather harmless except towards rubber, polyethylene or similar materials. If a solvent must be used for cleaning, the minimum amount should be applied for the minimum length of time. A vapor degreaser is one of the best ways for cleaning in solvents.

Toughness. The property of requiring the maximum input of work to cause rupture (toughness) requires a balance of tensile strength, elasticity and resiliency.

Creep. A non-reversible deformation of a plastic material when subjected to a steady stress—creep, occurs to some extent with virtually every resin or plastic. The endurance limit of a material is the ultimate permissible stress that can be placed upon it for long-term loading. All resins are subject to creep, but it is most pronounced with materials with minimum cure and crosslinking. Highly cured, tightly crosslinked materials show much less creep than do the more elastic, rubbery ones.

Fatigue. Decrease in ultimate rupture stress caused by intermittent loading, or fatigue, depends upon the amplitude and frequency of strain. Glass-binding bands, very widely used on traction armatures, are susceptible to fatigue if improperly designed and applied. The resin, the glass, the method of application and the amount of build up are all of great importance.

(To Be Continued)



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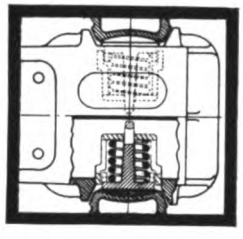
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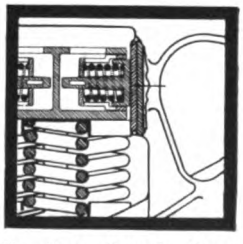
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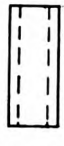


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RS-2 Spring cushioned pressures do not disturb load distribution on the journal.



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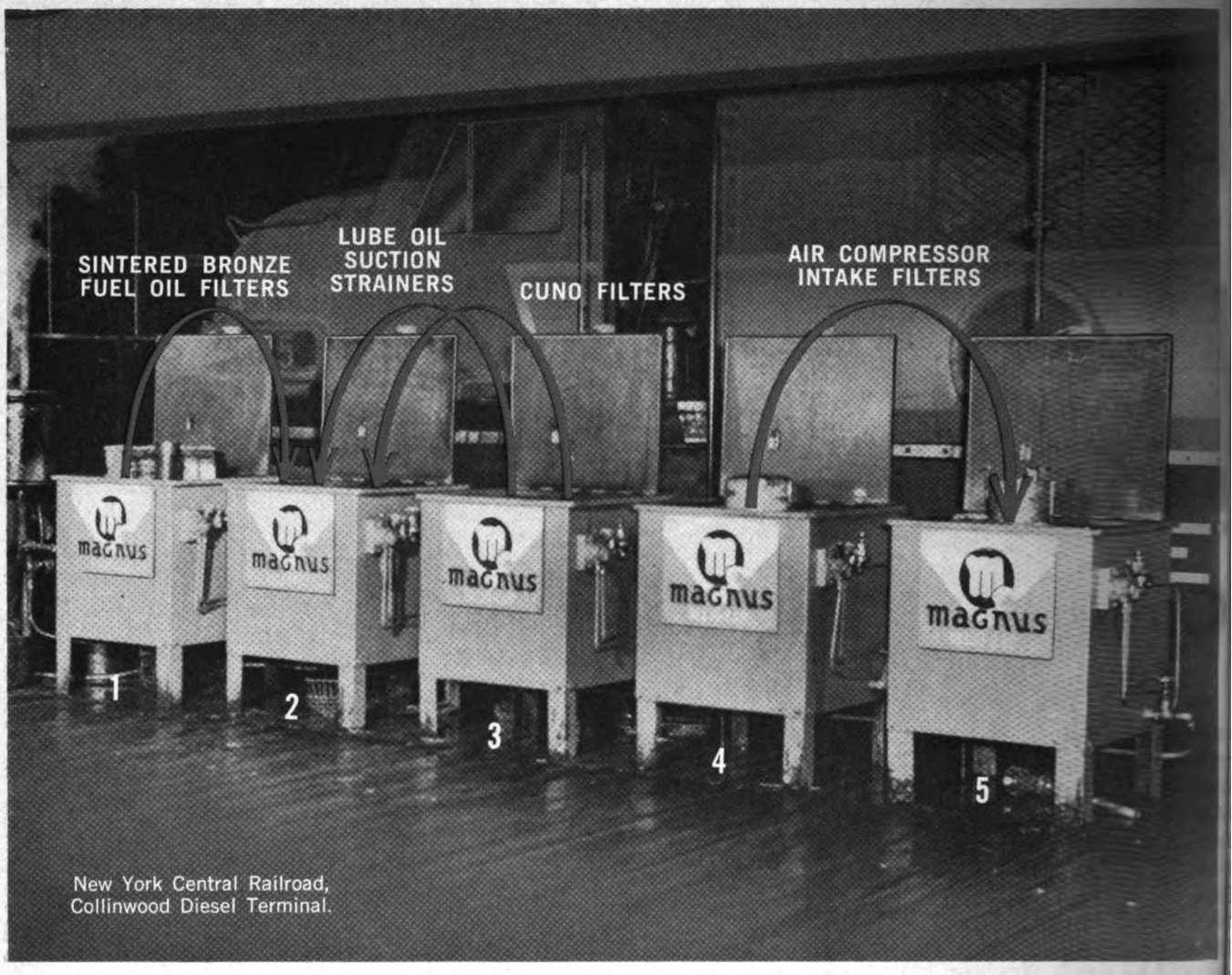
STYLE E-2 Volute Snubber Spring, 2½" Travel in 50 Ton Group.

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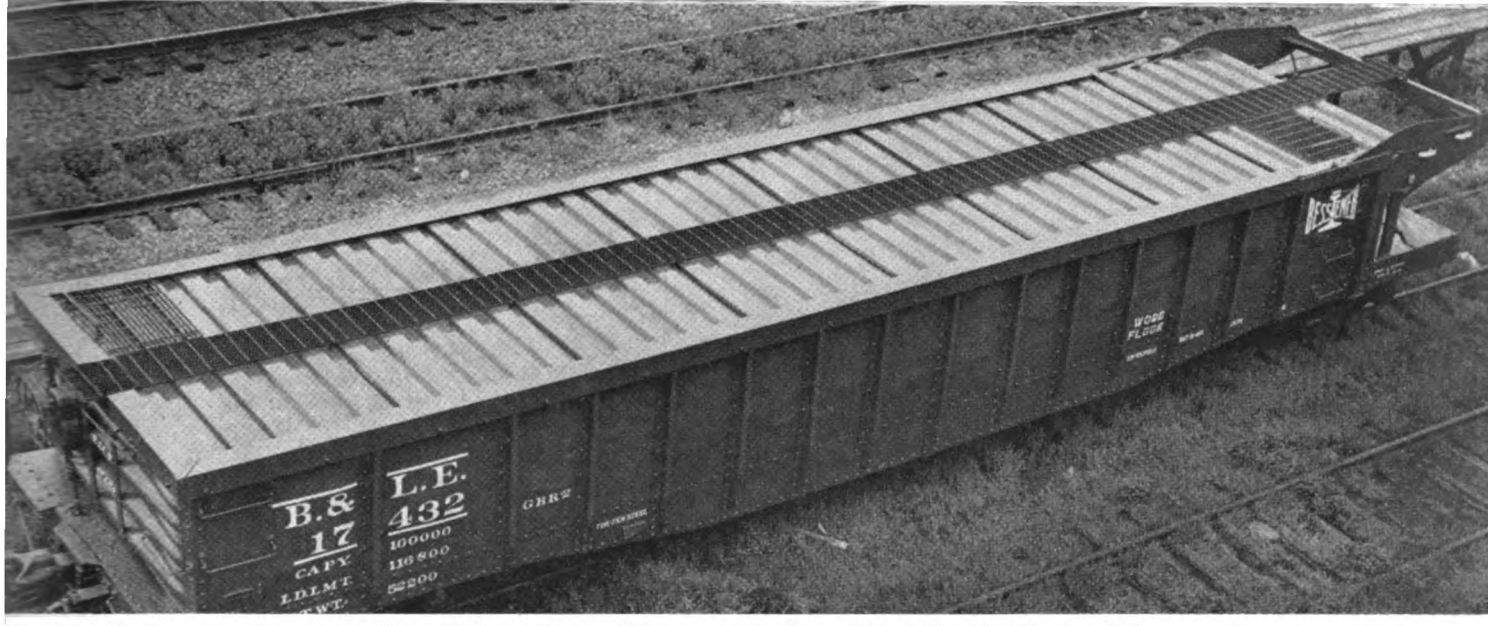
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Watertight MacGregor roof can be readily cranked open or closed by one man. Storing rack shortens length of carbody.

Covered Gondola Has Integral Roof

A covered gondola with an integral roof has just been completed by Railroad Supply & Equipment, Inc., U.S. licenses of the International MacGregor Organization which originally developed the arrangement for ship hatch covers. A Bessemer & Lake Erie 46-ft gondola was made available for the first U.S. installation of the MacGregor opening and self-storing roof. This car is equipped with eight of the chain-operated roof panels patterned after smaller roofs already in service on over 2,000 European cars.

The MacGregor roof, regardless of size, consists of a series of interlocking ribbed panels which are supported by rollers and moved by a precision-built endless-chain system operated by a hand crank at one end of the car. Each section rests on a pair of flanged rollers which run on tracks mounted atop the car's top side angles. Tracks, rollers, and the edges of the panels, along with the endless chains which are attached to each side of the panel most distant from the driving crank, are housed in a box-shape structure formed by a pair of angles bolted to each of the car's top side angles. This arrangement forms a waterproof enclosure for the sides of the panels when the roof is closed. Ends of the panels lap over each other so that these transverse joints are also waterproof.

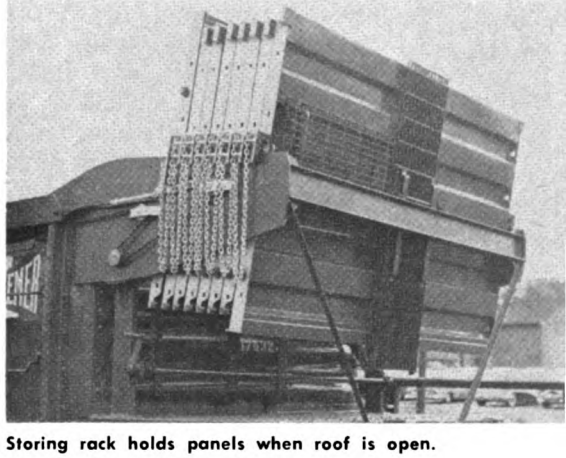
To open the roof of the car, a lock adjacent to the hand crank is released. When the crank is turned, the chains extending down both sides of the car are moved so that the leading roof section at the far end of the car is pulled toward the operating crank. This leading panel pushes each of the intermediate sections toward, and into, the storage ramp as it is pulled down the length of the car. The chain and drive are manufactured to close tolerances so that they form a positive drive without slippage, producing completely smooth operation. All rollers have Oilite bearings. The crank is operated by one man. Cranking pressure is about 10 lb and, at a normal cranking rate, the roof can be closed or opened in less than 2 min.

In addition to its main rollers, each roof section has a set of guiding rollers that serve to tip the panel into its vertical storage position at storing ramp.

During closing, the guiding rollers on each roof panel act to return it to the horizontal position. The endless chain again moves the leading section. This section is linked by a pair of short chains to the panel immediately behind it, and each succeeding panel is likewise connected to the one behind. As the leading panel is moved down the car, its pull first lowers each panel so it interlocks with one ahead, and rolls it to its final, fully closed position.

Because roof panels are joined with each other only by the short chains, it is possible to replace any damaged panel simply by lifting it from the storing ramp and substituting a good section in its place.

While the overlapping of the panels and the gutters which form the chain runway keeps rain from entering, there is some ventilation through overlaps.



Storing rack holds panels when roof is open.

Storage of the roof panels does require sacrifice of some cubical space. The 46-ft B&LE gondola was cut back 46 in. to install the storing ramp. According to engineers, the production model for a 46-ft gondola will provide an inside body length of 42 ft 4 in. It could be 43 ft 5 in. if running boards were ever eliminated.

Railroad Supply & Equipment will soon be producing a self-contained unit ready to be set on the car. The B&LE gondola which has been equipped with the MacGregor roof was built 21 years ago and, although there was considerable body distortion, the roof was installed without complication and can be closed and opened as readily as it could on a new car.

RS&E has also completed a MacGregor roof installation on a highway trailer and designed one for box cars.

Doc Lands His Answer



By Gordon Taylor

Doc Watts, the electrical foreman, had just entered the meeting room of the local diesel club when Pat Parker, a foreman at the Gulf Route, spied him. "You're just the man that I wanted so see," Pat shouted as he dashed over. "You gave me such good information on worn traction gears (RL&C, May 1961, p. 29) that I'd like to get your ideas on some other troubles we are having. I'm wondering if you could stop at our shop some day. We could talk over my troubles and, afterward, I'd take you to my favorite fishing spot where I can guarantee that you'll quickly catch your limit."

"Well," said Doc, "my weakness is fishing and I'm just sucker enough to fall for that bait. I'll be over to see you Saturday morning. Set up that fishing trip for Saturday afternoon."

On Saturday when, Doc got to the Gulf Route shop he found Pat correcting some trouble caused on a locomotive by grounded control circuits. The control relay had been shunted out by a chafed connection on a water-soaked wire leading to positive battery and by a chafed B12 wire grounded where it emerged from a conduit. With Doc's suggestions this trouble was soon cleared up.

"Thanks," said Pat; "this isn't the thing I really wanted to discuss. I'm ashamed that you found us with trouble that should never happen if we carefully checked control wiring and corrected weak insulation values when they are found.

"What I wanted to talk about is our traction motor commutators. Some of them are losing their smooth burnished surfaces. Most of them still have that dark oxide film which makes such a perfect surface for brush contact; but we do have others that don't look at all good. Frequently we have to rework them."

"Well," said Doc, "let's look over some of your motors and see if we can get any clues about your trouble."

They started down through the shop. After looking over all the motors on three units, and finding nothing wrong, Doc asked, "How much trouble do you have? There certainly doesn't seem to be anything wrong with these commutators."

"Actually this trouble isn't too common," answered Pat. "Every so often we find a unit with commutators which have lost the oxide film and in its place have the raw copper appearance which we know to be a surface over which the brushes do not move smoothly."

"Let's keep looking," suggested Doc. "I still want to go fishing."

The first motor on the next unit to which Pat and Doc then turned their attention proved to have a commutator with the raw copper appearance. "Let's check the other motors on this unit," said Doc. Their inspection showed the other three motors were in the same condition.

"It's odd," said Doc, "that we'd find all the motors on this unit in the same shape. This unit must have been assigned to some particularly heavy service. Are these the same grade of brushes used on the other traction motors?"

"Sure are," answered Pat. "After a lot of testing, we settled on a standard brand and grade of brush which has been satisfactory, except for the occasional unit which shows up with commutators looking like this. The brushes will also be wearing faster than usual."

"To what types of service has this unit been assigned?" asked Doc. "Are there other units around that have been working with it?"

"On its most recent trip it was by itself and not doing any work!" said Pat. "You see, it was towed in dead about 600 miles from the west end of the line. When we have heavy freight going west, we frequently multiple the units to get the trains over the heavy grades west of here. Along with giving us plenty of power for the westbound trip, this arrangement makes it possible to send units out west for local freight or yard service. When one of these units is again due for its regular inspection, such a unit will frequently be deadheaded back into this shop on a train. That shouldn't be too hard on commutators, should it?"

"Well, you have given us something to think about," Doc replied. "The fact that all four motors are in the same condition indicates that we are not dealing with individual motor troubles. Some operating condition is apparently affecting all motors on the unit in the same way.

"First, let's consider what causes a motor commutator to develop the

(Continued on page 59)

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.



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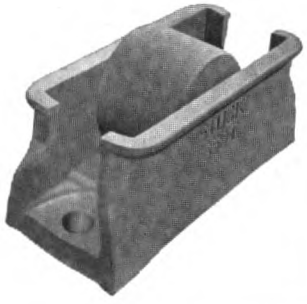
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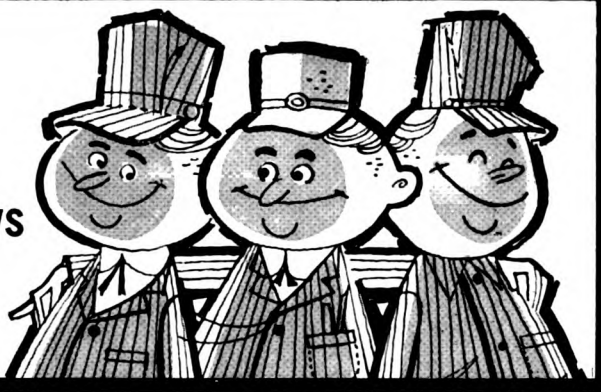
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Personal Mention

(Continued from page 10)

Grand Trunk Western.—*Battle Creek, Mich.* H. W. ASKEW appointed general superintendent equipment.

Gulf, Mobile & Ohio.—*Mobile, Ala.:* C. W. ESCH appointed chief mechanical officer, succeeding C. M. HOUSE retired.

Mr. Esch began with the GM&O as chief draftsman in 1926 and has served, successively, as mechanical engineer, master mechanic, superintendent of motive power and car equipment, and assistant general superintendent of motive power and car equipment.

Maine Central.—*Portland, Me.:* WILLIAM E. MALOY appointed mechanical instructor—train rules examiner. MELVIN L. CHARITY appointed road foreman of engines.

Milwaukee. — *Chicago:* C. A. BORGH appointed district general car foreman, with supervision over all passenger and freight car operations at Division street and Western Avenue. J. D. O'NEILL appointed general car foreman, Western Avenue coach yard, succeeding Mr. Borgh. *Tacoma, Wash.:* J. V. SANDS appointed district general car foreman, succeeding Mr. O'Neill. *Bensenville, Ill.:* L. P. BARRY appointed general car foreman, succeeding Mr. Sands. *Minneapolis, Minn.:* L. A. LINDEMER, car foreman, appointed assistant district general car foreman, Milwaukee Terminals-Davies Yard, succeeding Mr. Barry.

Missouri Pacific.—*St. Louis, Mo.:* LAWRENCE R. CHRISTY, chief mechanical officer, retired. *DeQuincy, La.:* R. E. HAUSSNER appointed assistant master mechanic, DeQuincy division.

Monon.—*Lafayette, Ind.:* E. E. KAUFFMAN appointed superintendent motive power and equipment, succeeding V. C. GOLDEN, now general manager, (RL&C, June, p 46).

Pennsylvania.—*Chicago:* A. R. MARSH appointed superintendent — equipment. Formerly assistant manager heavy repair shops at Altoona, Pa.

Seaboard.—*Jacksonville, Fla.:* L. B. ALEXANDER appointed master mechanic, North and South Florida divisions. *Savannah, Ga.:* J. G. CARLTON appointed master mechanic, Carolina division, succeeding Mr. Alexander. Mr. Carlton formerly master mechanic at Atlanta, Ga. *Tampa, Fla.:* F. B. CLARK, master mechanic, retired.

Southern Pacific. — *San Francisco, Calif.:* J. W. MCLAUGHLIN appointed general master car repairer, succeeding WILLIAM H. MEDILL, retired. *Los Angeles, Calif.:* F. KIMBALL appointed district master car repairer, succeeding Mr. McLaughlin. O. E. DENMAN appointed general foreman, car department, succeeding Mr. Kimball. Mr. Denman formerly general foreman, car department, at El Paso, Tex.

OBITUARY

Karl F. Nystrom, 79, retired chief mechanical officer, Milwaukee, died June 5 in Evanston Hospital, Evanston, Ill.

Supply Trade Notes



Fred W. Genger
National Castings



P. O. Willaman
WAB



L. S. Williams
WAB

NATIONAL CASTINGS CO.—*Fred W. Genger* appointed sales manager, New York office, Transportation Products Div. Mr. Genger formerly in headquarters sales offices in Cleveland.

■

RAILROAD FRICTION PRODUCTS CORP.; COBRA FRICTION PRODUCTS LIMITED.—*S. L. Williams* elected president and general manager of Railroad Friction and Cobra Friction, both of which companies are jointly owned by Westinghouse Air Brake Co. and Johns-Manville Corp. Mr. Williams also assistant to the general manager of the Air Brake Div., WAB.

■

WESTINGHOUSE AIR BRAKE CO., AIR BRAKE DIV.—*P. O. Willaman* appointed manager, Cobra brake shoe sales, with headquarters in division's New York office —Empire State Building, 350 Fifth avenue.

■

LEWIS BOLT & NUT CO.—*Frank W. Hughes,* Suburban Station Building, Philadelphia 3, Pa., appointed central east coast representative for Sealtite bolt and Locktite nut division.

■

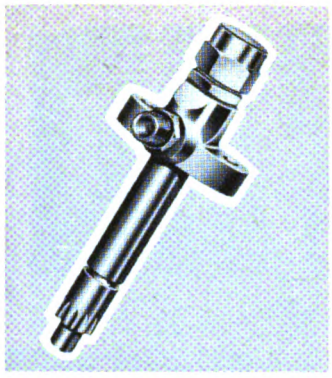
VELLUMOID CO. — *Bruce R. Williams* has joined Vellumoid Co. of Worcester, Mass., a subsidiary of W. R. Grace & Co., as assistant sales manager.

■

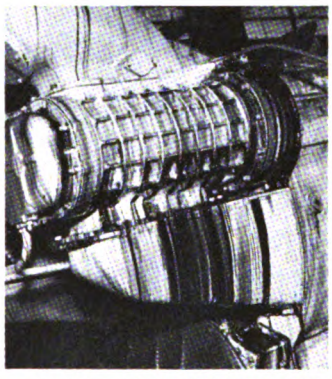
ALCO PRODUCTS, INC.—*James L. Layton,* transportation products sales representative, appointed regional sales manager.

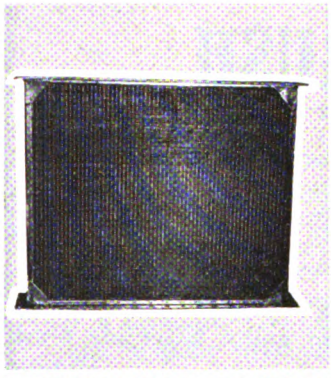
■

AIR REDUCTION - SPEER CARBON CO.—Agreement has been reached for the acquisition by Air Reduction of the assets











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LIX cleans everything! . . . fuel injectors, pistons, engines, lube oil coolers, exterior surfaces. LIX is specially formulated to meet your specific railroad cleaning needs . . . and to do it fast, efficiently and economically.

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wanted for assault on commutators. Highly dangerous, with pyromaniac tendencies. Known to haunt diesel-electric locomotives in an effort to make contact with potential victims. *Beware!* Suspect is emotionally unstable and armed with substance that pits and burns coppers.

When captured, suspect should be remanded to custody of Stackpole Carbon Company, St. Marys, Pa. If proved guilty, Stackpole brush specialists will make prompt recommendations for adopting well-bred brushes that give longest life consistent with burn-free commutation.



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keep diesels rolling p-r-o-f-i-t-a-b-l-y

electrical contacts • seal rings • welding & brazing tips • graphite bearings
electrochemical anodes • voltage regulator discs • electrical & electronic components
rocket nozzles

and business of Speer Carbon which will continue to operate under present management from headquarters at St. Marys, Pa.

■

AMERICAN BRAKE SHOE CO.—Cast-iron freight-car wheel plant at St. Louis, Mo., being converted to the manufacture of "Southern" cast-steel wheels at a cost of $2,000,000. Cast-steel wheel plant at Calera, Ala., also being expanded at a cost of $1,000,000.

■

WINE RAILWAY APPLIANCE DIV., UNITCAST CORP.—Modern Supply Co., *Robert E. Mann,* and *Earle A. Mann* appointed agents.

■

PULLMAN-STANDARD. — *George L. Green,* sales vice-president, elected vice-president in charge of marketing, succeeding *T. P. Gorter,* who continues as a vice-president, sales.

■

MOBILE OIL CO.—*Charles F. Garney* appointed manager of railroad sales, national accounts department. Mr. Garney's name and title appear incorrectly under General Electric Co. in the May issue.

■

GENERAL ELECTRIC CO.—GE announces two new universal type diesel-electric locomotives—the U8B and the U5B rated at 900 and 600 hp, respectively.

■

ELECTRO-MOTIVE DIV., GENERAL MOTORS.—*Floyd E. vonOhlen* appointed western special representative at San Francisco, Calif., succeeding *Corliss A. Bercaw,* retired.

OBITUARY

JAMES W. CROSSETT, 52, district manager, railway publications, Simmons-Boardman Publishing Corp., Chicago, died May 26 at Hinsdale Sanitarium and Hospital, Hinsdale, Ill.

Trade Publications

FASTENERS. Gripco lock nuts, clinch nuts, weld nuts, special nuts, and small finished nuts listed in 20-page Catalog 161. (Write: *Grip Nut Co., subsidiary of Heli-Coil Corp.,* Dept. RLC, South Whitley, Ind.)

■

CEMENTED CARBIDE PRODUCTS. Catalog 61 covers Kendex tools, Kendex K-bars, standard blanks, brazed tools, clamped inserts, and Kendex milling cutters. (Write: *Kennametal Inc.,* Dept. RLC, Latrobe, Pa.)

■

TRANSPORTATION MAINTENANCE CLEANING. 6-page folder gives detailed information on Wyandotte products for vehicle washing, steam cleaning, paint removal, radiator cleaning, and engine cleaning. (Write: *Wyandotte Chemicals Corp., J. B. Ford Div.,* Dept. RLC, Wyandotte, Mich.)

■

SAFETY POSITIONER. Bulletin AD-108 describes advantages of Saf-T-Bloc for snubbing of power presses during die servicing and maintenance operations. (Write: *Duff-Norton Co.,* Dept. RLC, 4 Gateway Center, Pittsburgh 22, Pa.)

(Continued from page 12)



Airless Spray Equipment

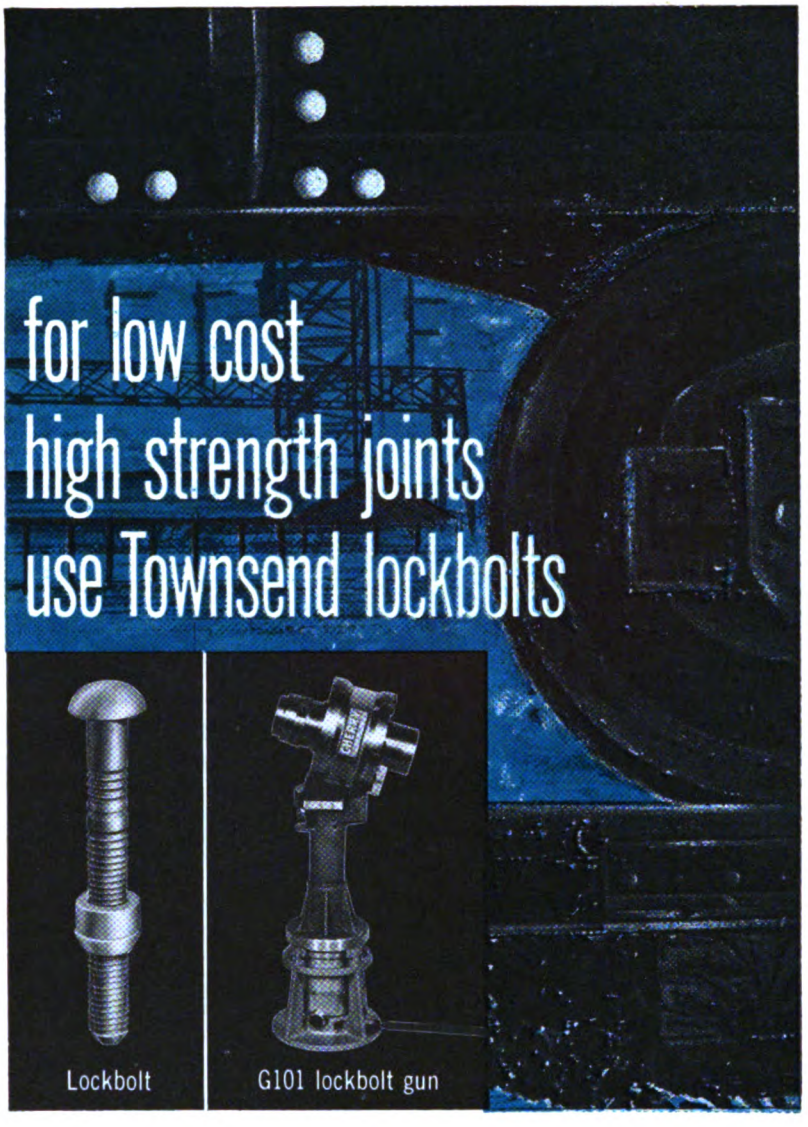
Eleven models, portable and stationary, are included in the Hydra-Spray line of airless spray equipment. The 5-gal Monark Hydra-Spray is designed for direct spray from original 1- to 5-gal containers. The 10-gal President models are available with or without elevator, three-wheel truck, surge tank, or filter. All work from the original 1- to 10-gal containers and handle one- or two-gun operations. Stationary 55-gal models utilize President or Bulldog pumps and are designed for multiple-gun, high-speed application of material. Either Monark or President pumps may be used with the Hydra-Stand units, in which material is kept circulating and drawn into the stand only as it is used. *Gray Co., Dept. RLC, 1062 Sibley st. N.E., Minneapolis 13, Minn.*

Portable Cleaner

The portable Buck Cyclone cleaner, an adaptation of the stationary model, is specially designed for cleaning cars and locomotives. It replaces hand dusting and sweeping methods with papers, dirt, and dust, being loosened by an air hose and the debris drawn out of the cars by the cleaner. Car-cleaning time, it is said, is cut by more than half and substantial savings in labor realized. *Ross & White Co., Dept. RLC, 400 W. Madison st., Chicago 6.*

Rust Preventives

Magnafilm 230 is a water-compatible, nonflammable rust preventive that can be applied directly to dry surfaces, or to surfaces wet with water or with soluble cutting oil emulsions. It conforms to Military Specification MIL-C-40084 (ORD) covering "Corrosion Preventive Compound, Water-Emulsifiable, Oil Type." Magnafilm 120 is composed of film-forming materials and rust inhibitors dissolved in safety solvent with water-displacing and fingerprint neutralizing compounds. *Magnus Chemical Co., Dept. M-124-4, Garwood, N. J.*



New car builders and repair shops get uniform, vibration-proof, secure joints at low installed cost with Townsend lockbolts.*

Townsend lockbolts are easy to install with a 2 or 3 man crew. Ordinary type fasteners require larger, more costly, highly specialized crews. Increased driving speed and the elimination of fitting-up operations step-up production. Worker fatigue is minimized.

A demonstration—in your office or on the production line—can be easily arranged. Our field engineer will demonstrate the practical and long lasting benefits of Townsend lockbolts. Write Townsend Company, Engineered Fasteners Division, P. O. Box 71-RR, Ellwood City, Pennsylvania.

*Licensed under Huck patents RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049; and 2,754,703.

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quality, dependability and safety for more than 75 years

Milwaukee Bi-level Cars

(Continued from page 41)

cooling, and the third positions an air-inlet damper. This damper conserves electric power by restricting entry of outside air during cold weather. When the temperature in the car is above 65 deg F, the damper is open and 12 kw are made available to the overhead heater and 4 kw to the floor heat. If the temperature of the car is below 65 deg F, the damper is closed and the 4 kw is switched to the overhead duct and 12 kw to the floor heat.

There is a 50-deg exterior thermostat for anti-freeze protection. The outside thermostat automatically controls the anti-freeze equipment in the toilets and the door-track heaters. These strip heaters in the foot of the door jamb provide smooth operation of the doors in even the coldest weather and eliminate snow or ice before it can interfere with door operation.

Upper and lower levels are illuminated by continuous fluorescent fixtures on the sides of the ceilings. Incandescent fixtures light vestibules, toilets, and cabs. All main lighting operates on 120-volt a-c; there are battery powered 32-volt, d-c emergency lights in some fixtures.

A transformer supplies the 120-volt a-c for lighting and door controls. Mounted under one of the gallery stairways in each car is a 93 amp-hr, 32-volt, lead acid battery, charged through a rectifier. The 64-volt, d-c locomotive controls are powered through the 27-conductor traction control train line.

All vestibule side doors can be pneumatically operated from any vestibule control station on the train.

The four-wheel trucks are of the single-equalizer, inside swing-hanger type, with coil springs throughout. Each truck has longitudinal bolster anchor rods and a pair of hydraulic shock absorbers which damp vertical bolster motion. Trucks have 6- x 11-in. roller bearings and 33-in. multiple-wear wrought-steel wheels. There is an individual tread-brake unit with composition shoe on each wheel.

Coupled length of each car is 85 ft. Height of the carbody above the rail is 15 ft 9½ in.; height from rail to vestibule step, 1 ft 6⅜ in.; height to main floor, 3 ft $8\frac{13}{16}$ in., and to gallery floor, 9 ft $1\frac{1}{16}$ in.

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EAGLE MANUFACTURING CO. Wellsburg, W.Va.
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Doc Lands His Answer

(Continued from page 52)

oxide film that gives brushes the desirable burnished contact path. Commutators don't have this highly polished oxide film when motors are received new from a builder. The film is formed when the proper grade of brushes, properly fitted to a perfectly round commutator running true in its bearings, are feeding current to the commutator. The flow of electric current has an important role in the formation of that oxide film.

"Without current flow," continued Doc, "you do not develop the film that all maintenance men like to see on a commutator. Many people do not realize what is taking place in a traction motor when a diesel is moving at 60 to 80 mph. Let's do a bit of figuring on your blackboard."

At the board Doc continued: "The average traction motor has a commutator diameter of 15.5 in., a circumference of slightly more than 4 ft. A freight unit with 40-in. driving wheels and 62-15 gearing has a gear ratio of 4.13. When operating at 50 mph, the motor armature is turning 7,720 rpm. The commutator surface speed under the brushes is 1,720 times 4 ft, or 6,880 ft per min.—that is 114 ft per sec. This means that the commutator speed is about 78 mph beneath the brushes. On a passenger unit, the commutator will slide beneath the brush at speeds up to 100 mph or more.

"It is now easy to see that a freight unit hauled dead in a train at speeds up to 50 or 60 mph for 600 miles could give its traction motor commutators a good dry shampoo that should develop lots of friction and do much to rub off the oxide film formed in regular service.

"Brush manufacturers who have made extensive tests will tell you that low average current density through brushes will result in the loss of the oxide surface film on commutators. If low current density will cause a loss of oxide film, think what happens when there is no current flowing at all.

"Another thing to consider is that, while the diesel unit was traveling 600 miles, the commutator surface traveled beneath the brushes a distance of 936 miles at speeds ranging up to 80 mph. Maybe it is no wonder that these commutators developed such a raw copper appearance.

"When we first placed our diesels in service a number of years ago," continued Doc, "they were shipped to us without traction motor brushes and we applied brushes before the units went into service. In fact, I recall that in the days when we operated gas-electric cars, those cars were always hauled to distant terminals without brushes. Then brushes were installed before the 'doodlebugs' went back on their regular runs.

"There are a number of factors that can affect commutator surfaces. When there is streaking or a raw copper surface, the source of trouble may be faulty commutation resulting from use of the wrong grade of brush, from low humidity of air surrounding the commutator, from excessive commutator temperature, from low average current density, or from excessive brush pressure.

"When a commuator surface becomes raw or streaked, the brush friction increases. This may cause chattering which can result in sparking. That starts a cycle of cleaning the commutator, and checking brushes so that a new oxide film will be formed to provide a path of minimum friction for the brushes. Certainly it is true that the less you have to sandpaper or stone a commutator, the more you prolong its service life.

"I think," said Doc, "that the cause of your trouble is your practice of moving diesel units dead in trains for long distances. Whether it's serious enough to require that units be worked to new assignments, instead of being deadheaded, is something you and your management will have to determine.

"I pointed out the probable cause of your trouble; now it is your turn to point out the spot where I can catch my limit of fish. I'm ready to start, so let's go."

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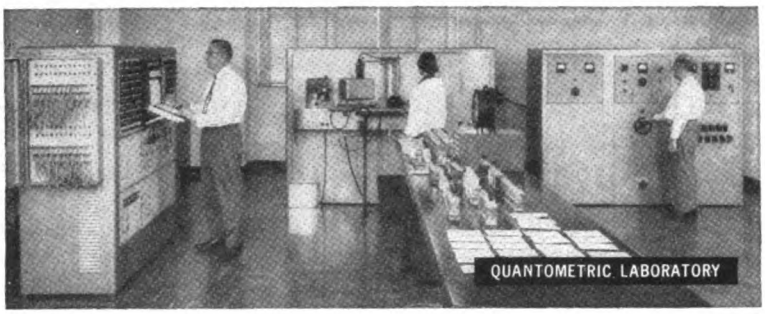
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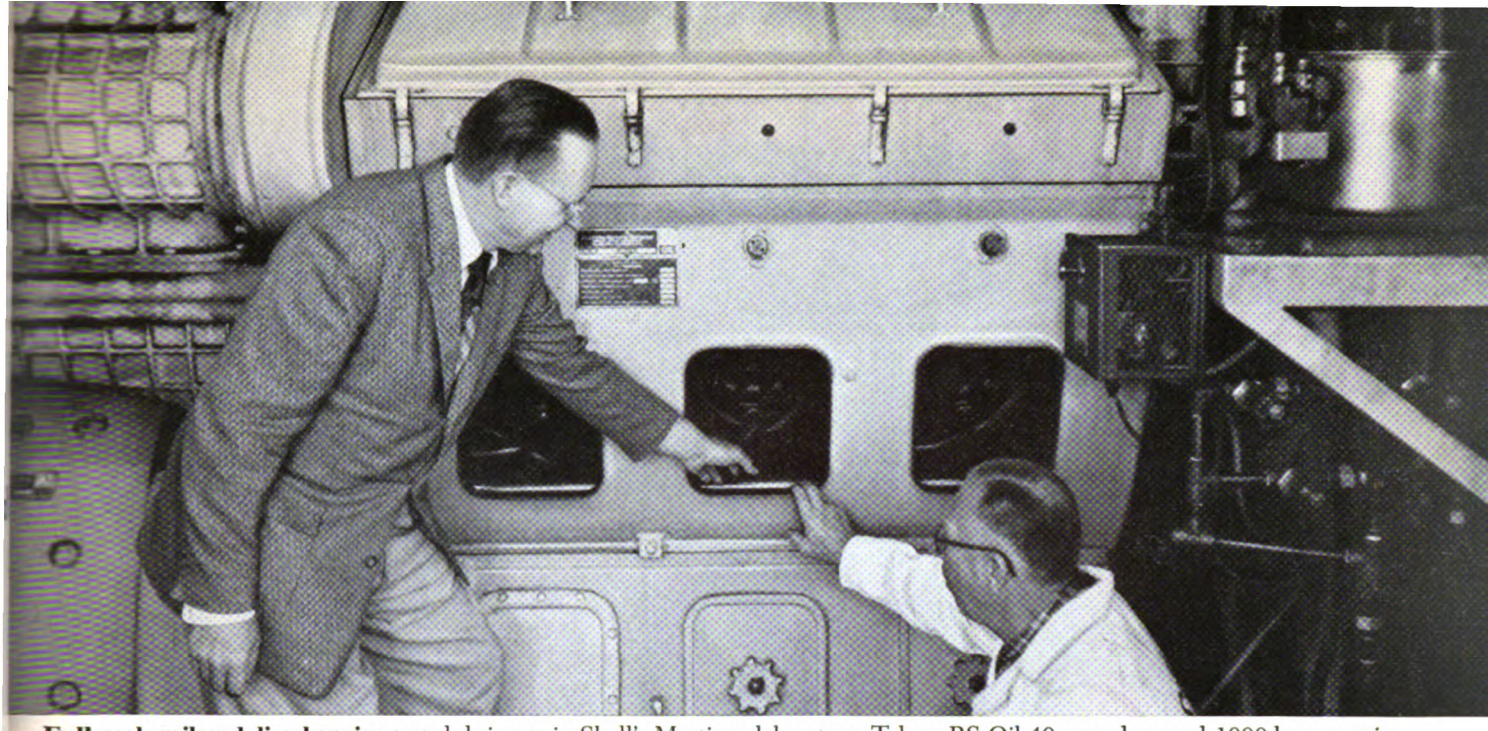
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Full-scale railroad diesel engine tests lubricants in Shell's Martinez laboratory. Talona RS Oil 40 passed rugged 1000-hour test in this engine, was then released by Shell Research for intensive field trials.

BULLETIN:

Railroads report that diesel locomotives using Shell's Talona RS Oil 40 can run for more than 250,000 miles without an oil change

Diesel locomotives used to require an oil drain every 30,000 to 50,000 miles. Now, even locomotives in heavy-duty freight service are rolling 250,000 miles—and more—without an oil change. The reason: Shell's Talona® RS Oil 40. Read how this new lubricating oil can trim operating costs for you.

UNDER normal railway operating conditions, Shell's new Talona RS Oil 40 can be used from overhaul to overhaul without draining.

And with Talona RS Oil 40, railroads are finding that they can extend intervals between engine overhauls. Often, by substantial margins.

Five key reasons

Here are some of the key reasons for the outstanding performance records that this new diesel lubricant is making:

1. Talona RS Oil 40 contains special additives to resist oil oxidation. This allows the oil to lubricate effectively, without excessive thickening, even in prolonged heavy-duty freight service.

2. Talona RS Oil 40 has good detergent-dispersant qualities. It helps keep engines exceptionally clean.

3. Talona RS Oil 40 contains alkaline additives to help neutralize damaging acids—a major cause of engine wear in diesel locomotives.

4. Talona RS Oil 40 provides outstanding protection for silver bearing surfaces.

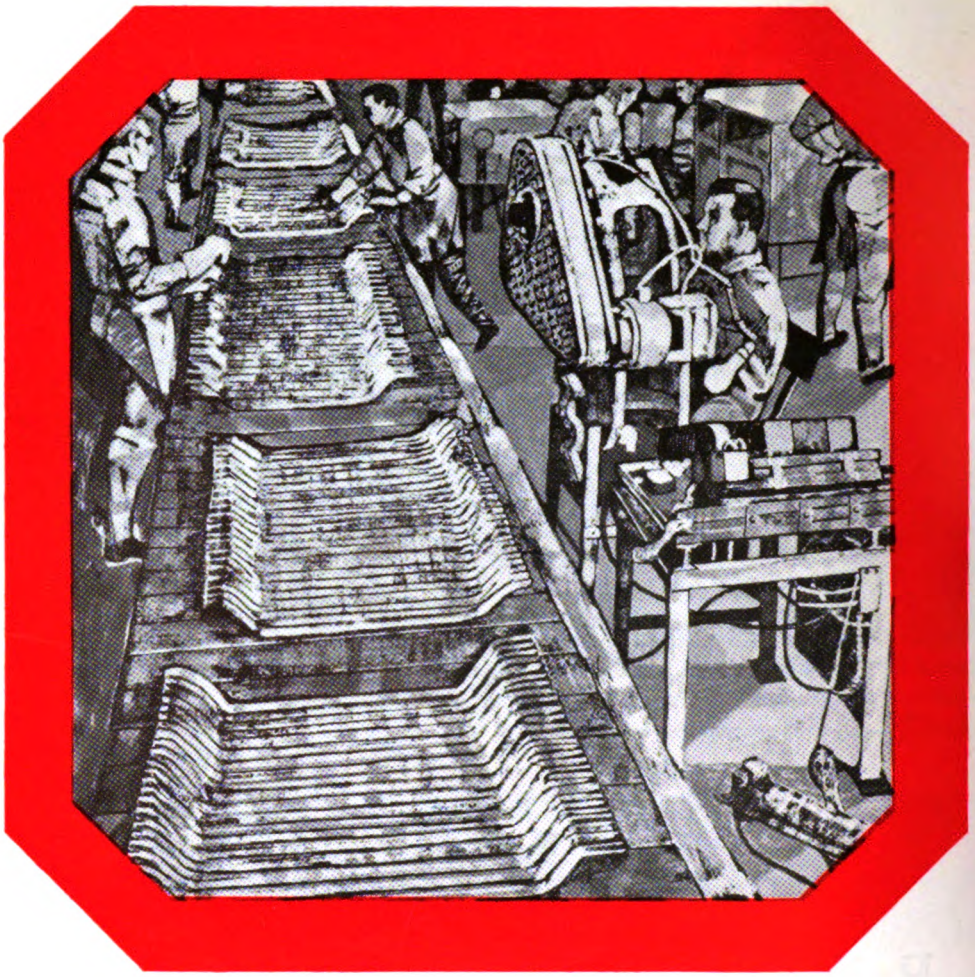
5. Talona RS Oil 40 has excellent filterability—a must for locomotive diesel oils.

NOTE: *All U. S. railroad diesel engine manufacturers have endorsed Shell Talona RS Oil 40 for use in their equipment.*

Your Shell Railroad Service Engineer will give you the details. Or, write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

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The Most Advanced Armature Coil... Insures Longest Life at Lowest Cost

Motor Coils Manufacturing Company has developed the industry's most advanced armature coil production line. New, one-of-its-kind equipment and machinery has been developed to guarantee maximum uniformity, quality, fastest and easiest winding, and long life for armature coils.

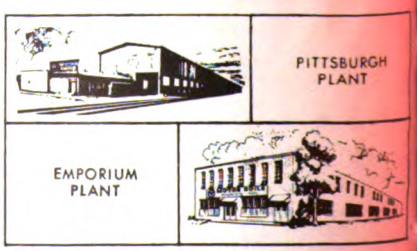
Before shipment, these Epoxi-Mica armature coils are subjected to exhaustive inspection and testing—the industry's most rigid quality control procedure.

Needless to say, Epoxi-Mica Armature Coils are adding immeasurable life to traction motors—resulting in substantial savings to railroads.

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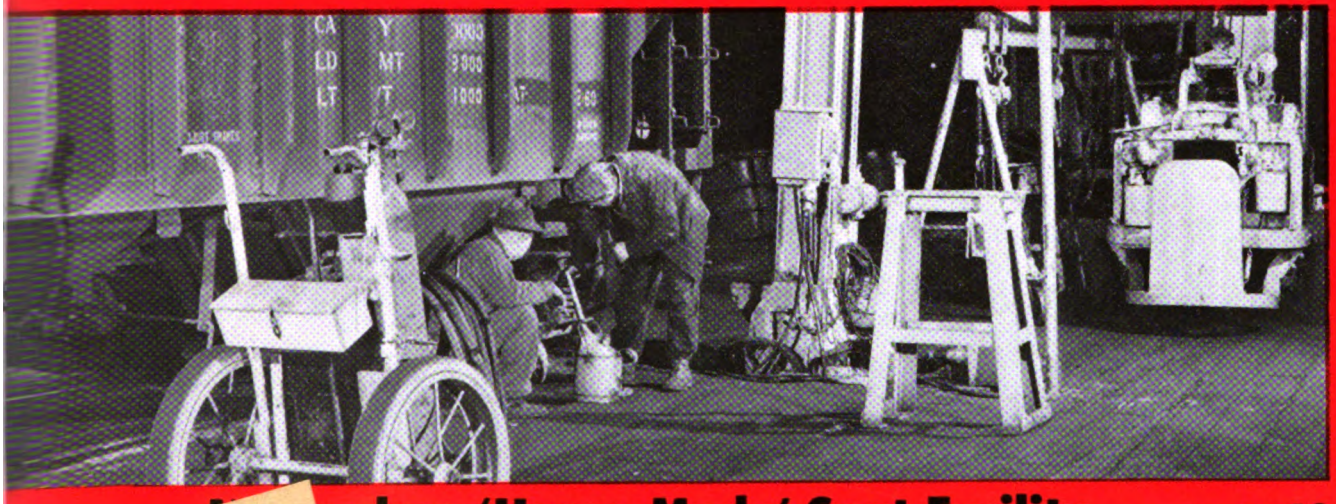
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L&N Adopts Disposable Air Filters. . . . . page 28

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Please send me a copy of the catalog, **Armco Wrought Steel Wheels.**

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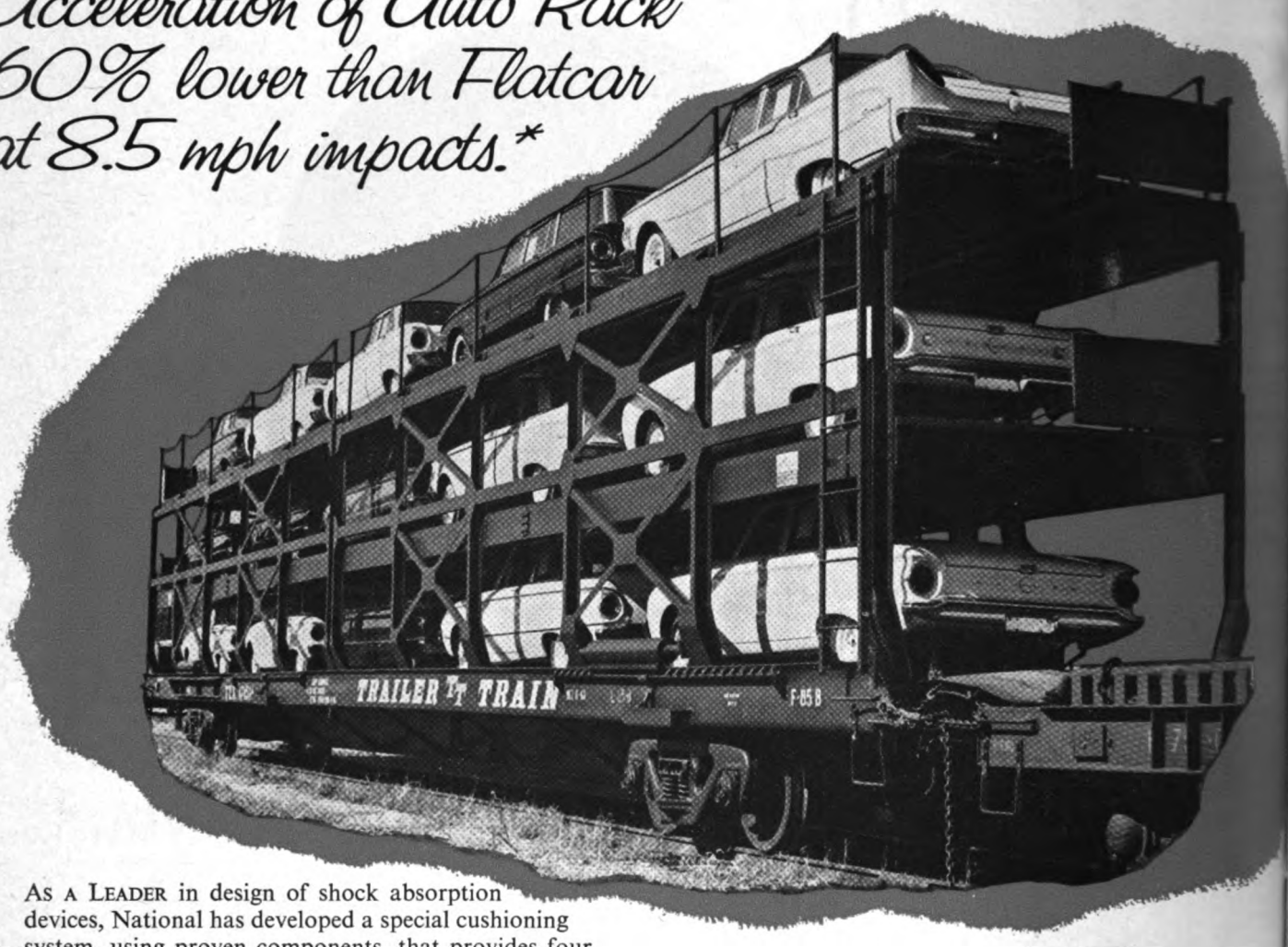
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ARMCO **Armco Division**

NATIONAL CUSHIONING SYSTEM FOR AUTOMOBILE RACKS

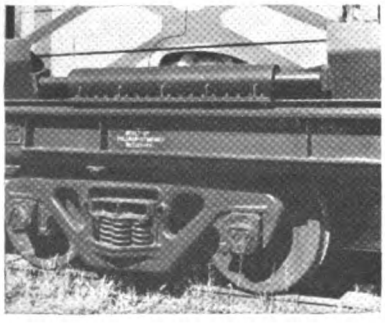
*Acceleration of Auto Rack 60% lower than Flatcar at 8.5 mph impacts.**



AS A LEADER in design of shock absorption devices, National has developed a special cushioning system, using proven components, that provides four important advantages for automobile transportation:

1. Auto rack acceleration 60% lower than freight car body acceleration at 8.5 mph impacts*
2. Positive *re-centering* of rack on car
3. Economy of spring-rubber combination over all-rubber devices
4. Impact tested under actual operating conditions

National Cushioning System-equipped automobile racks are now in service.
Automobile racks present unique problems in cushioning that cannot be solved with conventional shock-absorbing devices. We suggest that you consult National now for full details.



*Auto manufacturer's test data shows that auto rack acceleration was 60 to 65% lower than car body acceleration at 8.5 mph impacts.
National cushioning units for automobile racks consist of four separate tubular housings, one at each corner of the car, with plungers contacting vertical beams of the rack. Two housings at one end contain rubber pads similar to those used in National rubber draft gears; two housings at opposite end each contain four inner and outer steel coil springs of the same type now used in the improved National M-17-A draft gear. A-4631A

STEEL CASTINGS Centennial 1861-1961

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LOCO-
MOTIVES
AND
CARS

America's Oldest Trade Paper
August, 1961—Vol. 135, No. 8

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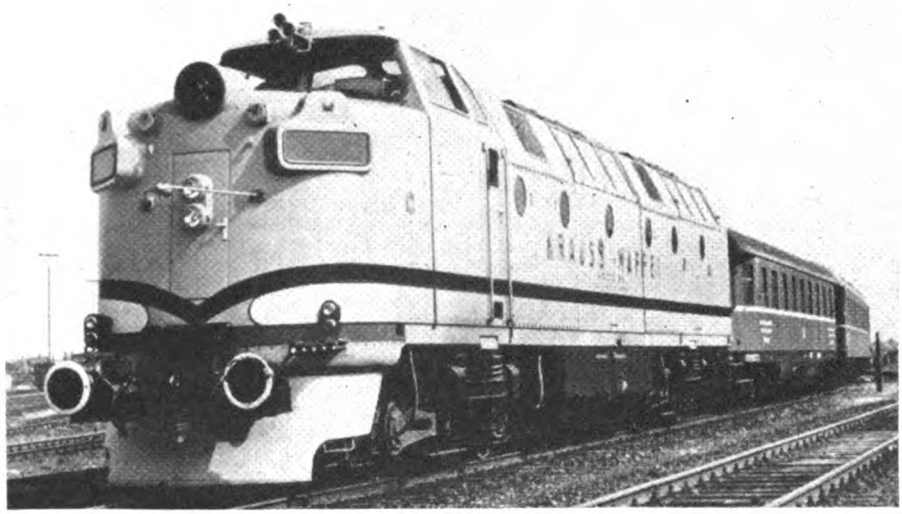
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REPORT FOR AUGUST



Road test of unit destined for D&RGW (above) was made on German Federal Railway during spring. Last month the first of SP units was operated on Austrian mountain grades.

Diesel-Hydraulics Complete European Tests

Diesel-hydraulics destined for the U.S. completed a series of road tests last month in Europe. Krauss-Maffei, builder of the six 4,000-hp road freight locomotives which are expected to be shipped to the Southern Pacific and Denver & Rio Grande Western in September, first put one unit through a series of braking and acceleration tests in West Germany and then sent another to Austria where it hauled trains on the 2.7% grades of the Semmering Pass line, a route which approximates lines of the two U.S. roads.

The six units were ordered in February 1960. Preliminary details were first revealed last summer at the AAR Mechanical Division meeting (RL&C, Sept. 1960, p. 27).

The 165-ton C-C locomotive on the Semmering tests—actually the first of the three SP units, pulled 950-ton trains of European freight cars over 2.7% grades at speeds of 16 to 20 mph. Only slippage occurred on wet rail after a night of rain. SP and D&RGW observers later commented that the slippage, even under these conditions, was not severe enough to be important. "During tests, the locomotives have performed just as we expected them to; what we need now is experience," W. D. Lamprecht, SP vice president, said at the conclusion of the Semmering runs.

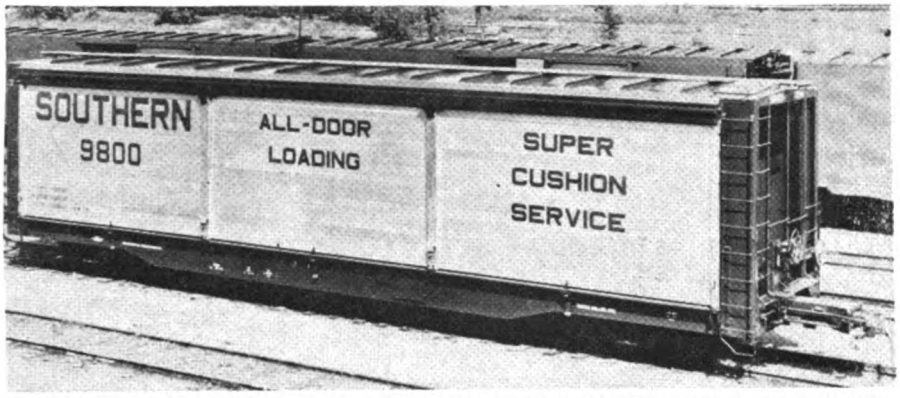
The 65-ft locomotive is carried on a pair of 6-wheel trucks with all axles powered. Because of the hydraulic transmission, all axles on each truck are mechanically coupled. Each truck is individually driven by its own 2,000-hp, high-speed Maybach diesel engine (RL&C, June 1960, p. 35). Power is transmitted to the truck through

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Southern has ordered 200 full-door box cars from Pullman-Standard. Based on a prototype developed by the Southern, the new P-S car has aluminum garage-type, roll-up side doors along the entire car side. It also has the Hydroframe-60 cushion underframe. "The car can be loaded as easily and economically as a flat car and can carry its lading safely enclosed," D. W. Brosnan, executive vice president of the Southern, commented.

a Voith turbotransmission containing three torque converters, built-in reversing gear, and attached hydrodynamic brake (RL&C, Feb. 1961, p. 21).

Dynamometer car tests carried out on the German Federal Railways in March and April 1961 showed the effectiveness of the hydrodynamic brake in the transmissions. This arrangement, the equivalent of the electro-dynamic brake used on diesel-electric locomotives, showed a maximum braking force of 47,500 lb at 26 mph. During one test, it brought a 715-ton train from 50 mph to almost a standstill in 875 yds.

Following delivery in September, it is expected that the D&RGW and SP will put their locomotives on mountain runs where the high-speed engines and hydraulic transmissions will operate under some of the most severe conditions existing in the U.S.

Road test results and complete descriptions of these high-horsepower units, the first European locomotives to be bought by U. S. railroads in over fifty years, will be published in the September issue.

Order More Cars, Railroads Urged

The American Railway Car Institute has issued a strongly-worded statement calling on railroads to "buy now" to forestall a threatened freight-car shortage of serious proportions. The shrinking car fleet, coupled with the rising number of cars needing repairs, bodes no good for either the railroad industry or the public it serves.

That was the salient point of a "buy now" appeal issued recently by Walter A. Renz, executive vice president of the American Railway Car Institute.

"The rolling stock of this country's railroads is in the poorest condition since the depression days of the 1930's and not prepared to meet the imminent needs of a resurgent national economy," asserted Mr. Renz. "During 1960, over 70,000 freight cars were scrapped and only 46,000 new ones placed in service. The process was accelerated during the first half of this year, with cars being junked more than twice as fast as they were being replaced.

"The total fleet of our Class I railroads today adds up to about 1,650,000 cars. Thus, over the past dozen years, this fleet has shrunk by about 5 percent in a national economy that has nearly doubled in size."

"Right now, 10 percent of the cars retained in the fleet are unfit for use. The situation is made the worse because it is uneven, with bad-order cars running as high as 30% for one railroad and around 25% for others. Our whole railroad system would have been in trouble a long time ago if other lines had not kept their rolling stock in good order. Freight cars, on average, are 18½ years old.

"It is not enough to concentrate on the increased utilization of a dwindling freight-car fleet. In a country as large as the United States, the present fleet represents a dangerously low level. Complaints about this condition have been coming from shippers in increasing numbers.

"Unless the railroads, especially those carriers that have been depending on others to do the buying, start replacing worn-out equipment, we may see a recurrence of the experience of several years ago when grain was piled on the ground because of the lack of cars. This time the shortage of cars will reach out to many more classes of commodities.

"From every standpoint this is the prudent time to order freight cars. The commercial carbuilders are capable of turning out 10,000 cars a month—cars that are revolutionary in design and capable of achieving economies that would make the railroads far more competitive. Yet the carbuilders' backlog is something like 4,000 cars—less than two weeks' work at peak production rates.

"It is sound business practice to have good freight cars and enough of them to meet any betterment in the economy.

"Through all the years of lean orders," Mr. Renz said, "the carbuilders have remained determined to help their railroad customers in the struggle to regain lost traffic. The carbuilders have been spending more heavily than ever before on research and development designed to help the railroads to reach out and obtain a large proportion of freight traffic."

New Procedure for Unusual Loads

New requirements for loading shipments not covered specifically by AAR Loading Rules have recently been issued by the AAR Mechanical Division's Committee on Loading Rules. The revised procedure was detailed at the recent annual session of the Division.

Under General Rule 1, Section 1, the Committee has revised the first paragraph under heading "Special Authority" and added a new second paragraph:

"Special authority must be procured by the shipper from the originating carrier for

(Continued on page 38)

Orders and Inquiries for New Equipment

Placed Since Closing of July Issue

Diesel-Electric Locomotive Orders

ROCK ISLAND. *Electro-Motive:* 10 1,800-hp GP-18 road switchers. Cost, $1,600,000. For autumn delivery.

UNION PACIFIC. *Alco:* four 2,400-hp DL-640 road switchers; *Electro-Motive:* three 2,400-hp SD-24 road switchers; *General Electric:* four 2,500-hp U25B road switchers. Cost $2,600,000. All units, for high-speed road-freight service, scheduled for August delivery.

Passenger-Car Orders

NEW YORK CITY TRANSIT AUTHORITY. *St. Louis Car:* 236 subway cars for IRT division. The 51-ft, 44-seat cars to be semi-permanently coupled in two-car sets. Unit cost $110,790. Delivery 1962.

UNION PACIFIC. *St. Louis Car:* 35 postal storage cars; 10 baggage cars. Approximate cost, $6,500,000. General Steel Industries to supply cast-steel 6-wheel trucks and end underframes for the 85-ft cars. Deliveries to begin second quarter 1962.

Freight-Car Orders

AMERICAN REFRIGERATOR TRANSIT CO. *Pacific Car & Fdry.:* 10 50-ft, 70-ton, steel-sheathed refrigerator cars of 2,838 cu ft capacity.

GULF, MOBILE & OHIO. *Pullman-Standard:* 400 50-ft box cars; 75 hoppers.

KATY. *Pullman-Standard:* 50 Hydroframe-60 box cars; 20 box cars with DF loaders.

NORTHERN PACIFIC: *Pacific Car & Fdry.:* 50 50-ft mechanical refrigerator cars equipped with Equipco load dividers, roller bearings, and Trane refrigeration. Ten to be equipped with Witte Model 120-RDA, Type E power plants; 40 with Stewart & Sevenson Model 2-71 Detroit diesel engines. Cost of order, which is part of 1961 car program, approximately $1,450,000. Scheduled for September delivery. *General American:* 2[illegible] 70-ton, 2,600-cu ft Airslide covered hoppers. $300,000 order for fourth quarter delivery.

SOUTHERN. *Pullman-Standard.* 200 50-ft full-door box cars (photo above) with Hydroframe-60 cushion underframes and nailable steel floors.

WABASH. *American Car & Foundry.* 515 40-ft 50-ton box cars with 9-ft doors and roller bearings. Cost $5,000,000. Delivery to begin in October.

Notes and Inquiries

General American adding new cars worth $[illegible] to its fleet in 1961, according to GATC Board Chairman T. M. Thompson. Company has also launched a container pool that it expects to develop along lines of its car fleet.

New York City Transit Authority's proposed capital budget for 1962 includes $185,820,000 for purchase of 1,580 new subway cars. Budget subject to approval by Board of Estimate.

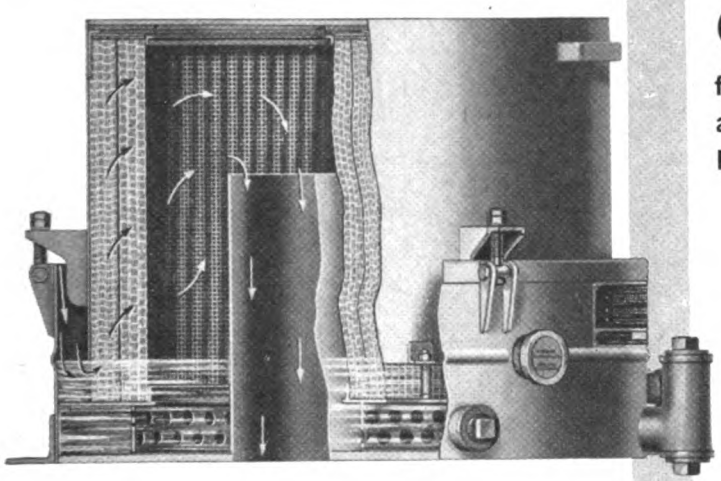
Pacific Fruit Express, acquiring 400 40-ft, mechanically refrigerated trailers (Tempco-Vans) to cost "several million" dollars. Trailers, scheduled for delivery by early fall, will be able to maintain exact temperatures ranging from below zero to 70 deg.

Southern Pacific new-equipment program for 1961 includes 34 diesel locomotives (31 delivered by June 1); 2,342 freight and passenger cars (1,186 delivered); 275 bi- and tri-level rack units for handling automobiles (107 delivered).

Trailer Train has concluded arrangements with Shippers Car Line for performance of a "major portion" of TTX's heavy-repair car program for 1961. Repairs to be handled at SHPX shops in Kansas City, Mo. Number of TTX flat cars scheduled for work this year not yet announced, but it is understood that such work is being cycled "entirely on a mileage basis."

One of these

Air-Maze Filters
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Air-Maze OIL BATH Filter

for heavy airborne dirt loads and minimum servicing. First choice because...

- Removes up to 97% of all objectionable dirt from intake air!
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- No special oil required . . . uses same type lube oil as in engine or air compressor.
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- Operates longer between cleanings . . . usually 90 days between cleanings. No special oil is required.
- Simple, inexpensive installation in existing vertical panel adapters on air intakes.



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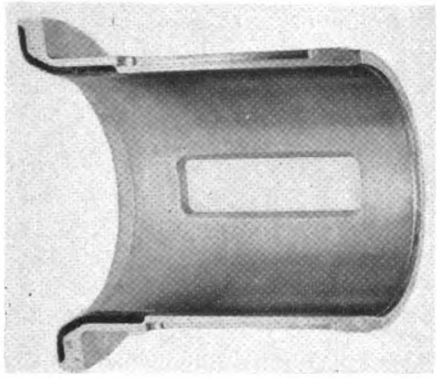
Contact your locomotive builder or write us for further details.

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LOCOMOTIVES AND CARS WHAT'S NEW IN EQUIPMENT



Motor Support Bearing

Felt flange lubricators on new EMD traction-motor support bearings are said to reduce wear of the bearing flanges considerably. The felt strips are embedded in the flange face and extend into the modified hour-glass bore at four places on each bearing. Any lateral movement of the axle or traction motor causes the wheel or gear hub to contact the oil-saturated felt strips, applying the proper amount of oil to the wheel or gear hub. The rotation of the wheel then spreads this oil in a thin film over the entire face of the bearing flange. The relocated narrow window opening in the bearing eliminates splash loss and adds 33 sq. in. of bearing surface. Field tests under a wide range of climatic and terrain conditions indicate up to 500% increase in mileage between maintenance periods. *Electro-Motive Division, General Motors, Dept. RLC, La Grange, Ill.*

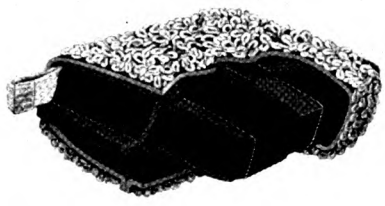


End Panels

A paneling system, fabricated from a columbium-treated steel developed for applications where lightweight strength is a vital factor, is being used for lining interior end walls of 500 box cars now in production on the Northern Pacific. The paneling is said to give the car end walls 50,000 psi minimum yield strength protection, with a reduction of 525 lb per car in the weight required to obtain the same strength with conventional carbon steels. The Stran-Steel paneling, welded to the protruding car-end corrugations, eliminates the need for weld studs and wood furring strips to which all-wood or combination steel-wood panels have been nailed or bolted. Installation costs are said to be almost 40% lower than for other end-wall lining methods. *National Steel Corp., Dept. RLC, Grant Building, Pittsburgh 19, Pa.*

Equipment Cleaner

Tysol 196 is a concentrated liquid cleaner that mixes either with hard or soft water. It is said to be particularly adaptable for cleaning interiors and exteriors of locomotives and passenger and freight cars, including fruit, dairy, and meat cars. The liquid can be sprayed, mopped, or brushed on floors and vinyl surfaces, and is said to rinse freely from windows and other surfaces. *Chemical Research Associates, Dept. RLC, 333 N. Michigan ave., Chicago 1, Ill.*



Journal Lubricator

The Royal non-reversible lubricator pad features two felt-encased blue-tempered flat-steel springs arranged to maintain constant lubrication to journal contact. Cotton yarn loops chenilled through the felt are said to provide a ready flow of oil and prevent glazing. The lubricator is AAR approved for test application in interchange. *Journal Box Servicing Corp., Dept. RLC, 332 S. Michigan ave., Chicago 4.*

Transistorized Control For Rail Cars

Motorman control of rapid transit and commuter-type rail cars is obtained through a transistorized control (SCM—simplified cam magnetic) which eliminates interlock and relay contacts in the control circuits. These static components are mounted on "plug-in" assemblies that make insertion foolproof. A single cam-shaft-type controller provides mechanical interlocking of the power switches mounted on it. Because all components are electrically operated, temperature variations do not affect performance. The control has been tested and evaluated on GE diesel-electric locomotives. *General Electric Co., Dept. RLC, Schenectady 5, N.Y.*

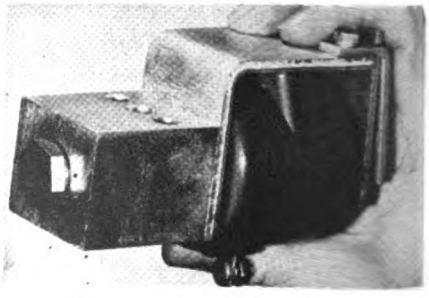


Nozzle Pressure Tester

The Hartridge nozzle Poptest utilizes a hand-operated hydraulic system with a self-priming pump, which provides instant fuel delivery at any position of the operating lever. The pressure gage is graduated from 0 - 400 ats. and 0 - 5900 lb psi. The tester weighs 22 lb and can be easily moved without draining and refilling. It comes complete with connectors for S and R injectors of standard thread and cone size. Additional adapters can be had for the T, U, and V sizes more commonly used on Alco, Baldwin-Lima-Hamilton, and Fairbanks, Morse engines. *Diesel Injection Sales & Service, Inc., Dept. RLC, 1120 E. Brambleton ave., Norfolk, Va.*

Glass Reinforcing

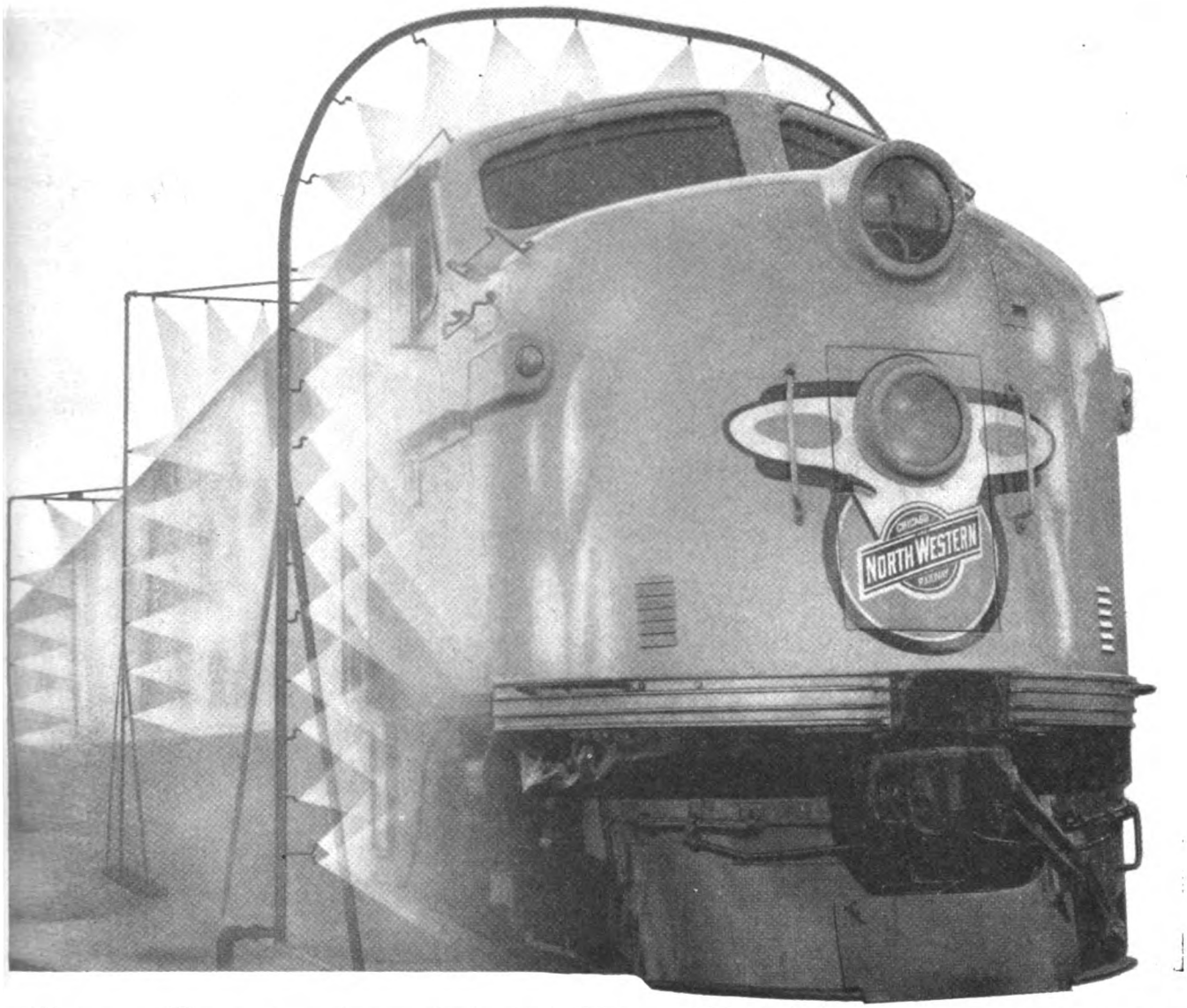
Fast wet-out features the Type 7170 fiberglass roving designed for spray-up guns used in work with glass reinforced plastics. The roving has a specially formulated chrome-type binder. It is said to chop cleanly, without clumping, and to conform readily to intricate shapes and radii. Its softness traps resin without draining, resulting in an absence of dry areas in laminates having ratios of up to 40% glass content. *Johns-Manville, Dept. RLC, 1810 Madison ave., Toledo 1, Ohio.*



Magnet Valve

A magnet valve for use with pneumatic devices on diesel-electric road locomotives features an encapsulated coil that resists mechanical damage and eliminates failures

(Continued on page 10)



they all come CLEAN *with...* TYSOL 196

For oily sticky stains, spots, bug deposits, grease and grime you can't beat the penetrating, powerful, yet gentle finish-preserving action of TYSOL 196! It's an easy-to-use liquid that mixes instantly with hard or soft water. Melts away the soil in minutes!

TYSOL 196 works well in scrubbing machines, and in steam cleaning, too, because it tends *not* to clog coils. Works wonders in diesel engine rooms, cabs, car exteriors, car interiors. Safe for aluminum! Truly, TYSOL 196 is *your* all-purpose, all-around cleaner. Dries with *never* a streak; rinses freely from windows.

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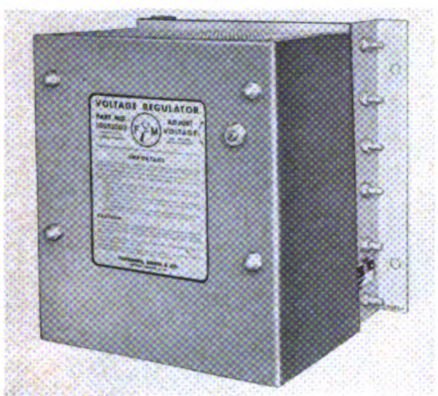
A LITTLE TYSOL 196 GOES A LONG WAY...you'll see that especially when you hand brush to achieve that final, sparkling finish you want. TYSOL 196 suds up *fast*...rinses clean as a whistle...and you *save* because it's so concentrated

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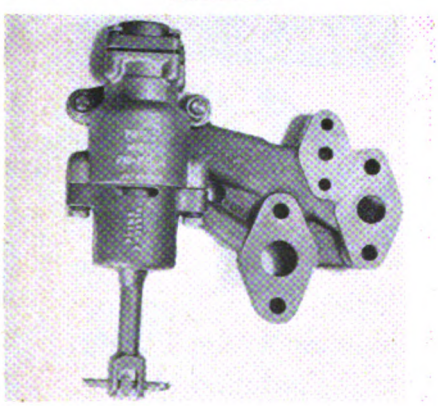
WHAT'S NEW IN EQUIPMENT—(Continued from page 8)

caused by dirt, moisture, and lubricants. The metal seat in the valve, it is said, assures trouble-free operation up to six years without inspection or cleaning, and the electrical design of the valve prevents overloading of circuit relays. *General Electric Co., Dept. RLC, Schenectady 5, N.Y.*



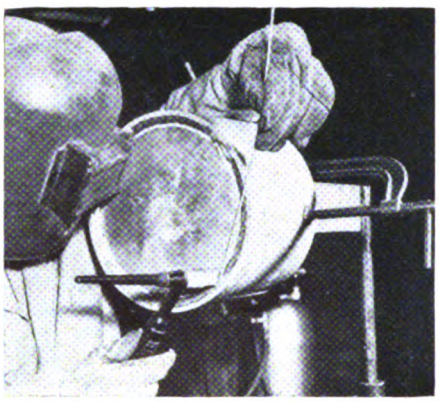
Voltage Regulators

Transistorized voltage regulators for use in controlling output of auxiliary generators in locomotives and rail cars are now available in a 125-volt size. The 125-volt model is 10¼ in. high, 10⅜ in. wide, 8-$^{9}/_{64}$ in. deep, and weighs 22 lb. Like the earlier 75-volt model, it holds the desired voltage within 1% plus or minus and requires no shock mounting. There are no moving parts. *Magneto and Engine Accessories Div., Fairbanks, Morse & Co., Dept. RLC, Beloit, Wis.*



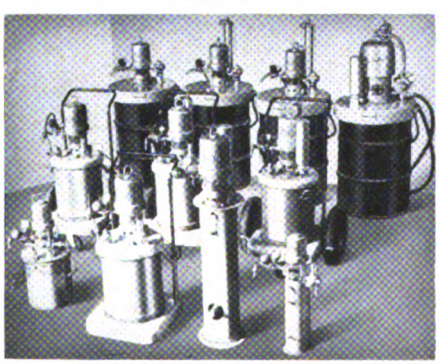
Brake Cylinder Release Valve

When actuated, the Prime brake cylinder release valve exhausts pressure from the brake cylinder while conserving air in the two-compartment reservoir. This cuts the time needed to bleed and recharge the brake system. The valve does not affect operation of the AB brake system and can be supplied for application to the valve either with a separate or single-release rod. *Prime Manufacturing Co., Dept. RLC, 1669 S. First st., Milwaukee, Wis.*



Heliweld Holder

The Airco H16-A is said to be the first air-cooled tungsten-inert-gas holder with 160 amp a-c- or d-c continuous capacity. Its head clearance is 2⅞ in. and its air-cooled construction eliminates the need for a water system. Nozzle orifice sizes are available in 1¼ and 1⅝ in. lengths. Tungsten electrodes from .020 through $^{5}/_{32}$ in. diameter and from 2 to 7 in. in length can be accommodated. Argon, helium, or mixtures of argon and helium shielding gases can be used. *Air Reduction Sales Co., a division of Air Reduction Co., Dept. RLC, 150 East 42nd st., New York 17.*



Airless Painting Outfit

All parts of the pump of this compact airless painting outfit in contact with fluid being sprayed are of special hardenable stainless steel. Stainless-steel seats in the foot valve and piston assemblies are replaceable. The pump ratio is 25 to 1; air consumption, 3 to 8 cfm. The outfit has a 15-ft length of nylon Hi-pressure hose. *Binks Manufacturing Co., Dept. RLC, 3114-40 W. Carroll ave., Chicago 12.*

Liquid Lock

Loctite, a liquid sealant, is available in two grades for railroad use—regular and heavy. It is easily applied to metal surfaces, joints, bushings, bearings, nuts and bolts. The regular grade is best applied on clean surfaces, but is effective under all conditions. It may be directly applied to surfaces before joining by use of a squeeze type bottle and long applicator tip. It cures in 6 to 12 hr. Bolts and nuts may be treated while nut is tight on the bolt. The heavy grade has all the properties of regular grade, except it is a heavier liquid. It is recommended for application to surfaces with excess tolerances, or bolts with large, coarse threads. *Rails Co., Dept. RLC, 187 Maplewood ave., Maplewood, N. J.*



Welding Torch

The ST-5 500-amp torch is for all four types of mig welding—spray arc, short arc, plug, and spot welding. It can be used with all Sigmatic mig welding machines. All service lines (gas, power, water, and wire) enter the torch through the rear of the barrel. Its cooling system brings water directly into the nozzle body to cool the contact tube, permitting continuous operation at currents as high as 500 amp, even with carbon-steel welding wire. The pistol-grip handle is adjustable along the torch barrel and is removable. *Electric Welding Dept. Linde Co., Division of Union Carbide, 270 Park ave., New York 17.*

Rolled Alloy-Steel Shapes

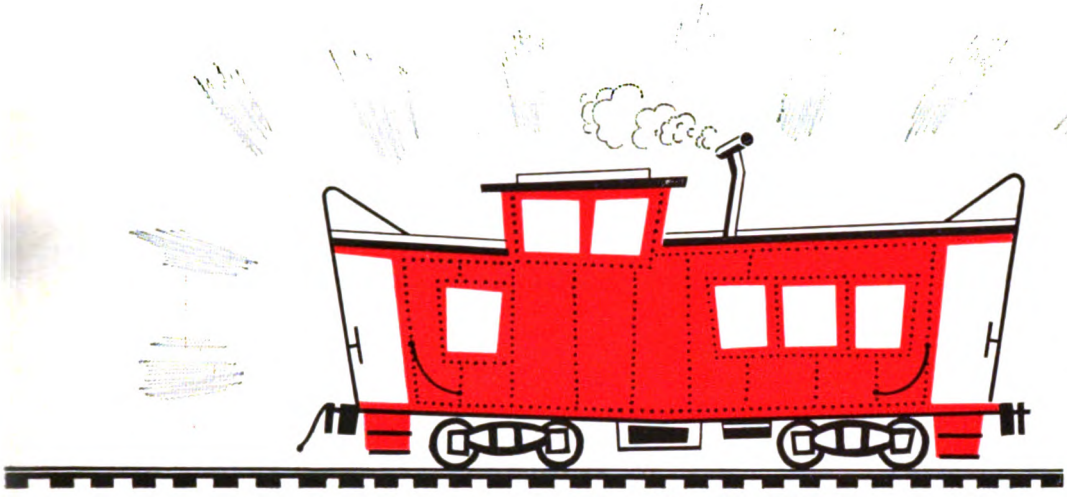
Rolled structural shapes made from quenched and tempered alloy steels are now furnished in standard I-beams, channels and angles, in a wide range of standard sizes and foot weights, and in lengths up to 40 ft. Compositions include USS T-1 and T-1 type A constructional alloy steels; 9% nickel steel for cryogenic applications at temperatures as low as —320 deg F, and HY-80 naval armor steel. *United States Steel Corp., Dept. RLC, Pittsburgh 30, Pa.*

Locomotive Parts Lubricant

Application of a colloidal graphite dispersion of petroleum oil, Oildag, is aid to have reduced maintenance and expense in diesel locomotive parts replacement on the Green Bay & Western ½ pt monthly is used on each of 17 locomotives. The dispersion is applied with a coarse brush to vestibule diaphragm or connecting attachments between locomotive units; with a grease gun to coil and elliptic springs. *Acheson Colloids Co., Dept RLC, Port Huron, Mich.*

(Continued on page 41)

Comfortable Caboose



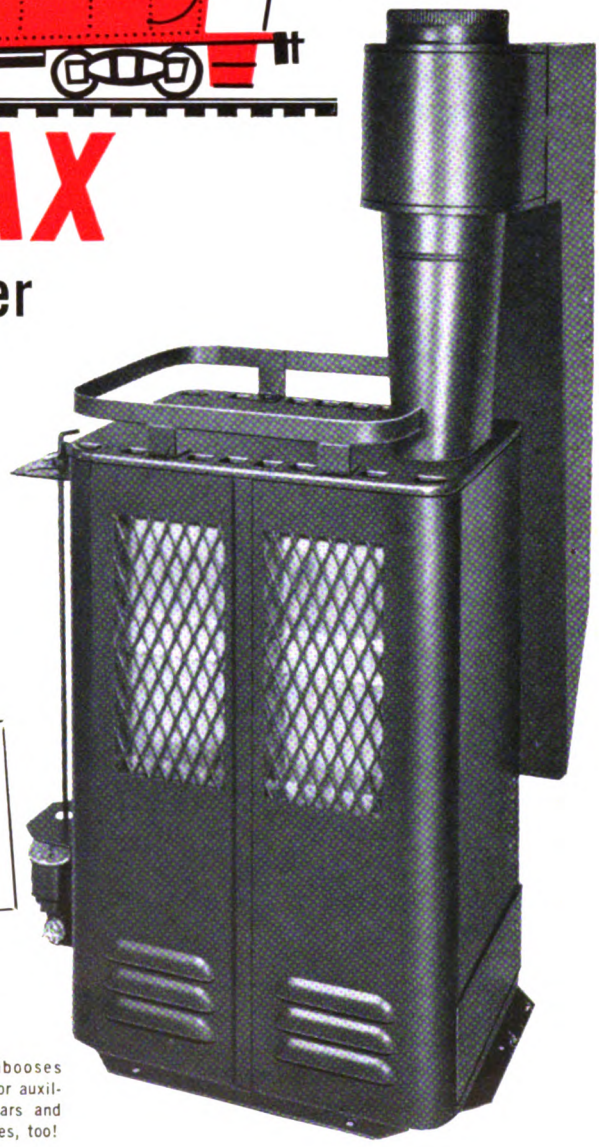
Equipped with . . . AJAX Cleen-Flame Space Heater

Fast, high heat in coldest climates! Simplified, foolproof adjustment and control. Surface cooking, with a positive pan holder. High crew satisfaction. The AJAX Cleen-Flame Space Heater has modern features!

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NEW FEATURES: Burners, baffles and oil control unit *very quickly removed* for *easy* cleaning! *PLUS*...New Summer Cooking Feature! With a simple, 5-minute adjustment, heat is directed to *top plate*. Radiant heat into caboose is substantially reduced! No parts to remove; no parts to install.

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PROGRESS PRI MEMBER

EDITORIALS

Are We Ready?

Do the American railroads have the passenger and freight cars that will meet adequately the transportation needs of a national emergency? The answer to this question is of prime importance in view of the world situation and President Kennedy's July 25 address on defense plans to meet this situation. It is important because for even a possible limited emergency we believe the railroads will be asked again to handle the major part of our nation's domestic transportation requirements.

American railroads did a remarkable transportation job during World War II. They did it by using every piece of equipment they owned that could be made operational. Many of us can remember that some of that rolling stock was not exactly what would be classified "up-to-date"; as a matter of fact a substantial part of it would have been scrapped under normal conditions long before war's end in 1945.

In 1941 there were about 30,000 passenger-carrying cars on our railroads. Now there are around 17,000 cars or less than 60 per cent of the number we had 20 years ago.

If passenger travel by air or on rubber becomes a luxury we cannot afford during an emergency, it is almost certain that travel by rail would have to be rationed. The retirement of passenger cars and the absence of any significant passenger-car buying, except suburban equipment, in the last several years would make such a move necessary with the relatively small passenger-car fleet we now have or will have in the near future.

Freight cars on Class I railroads totaled almost the same on July 1, 1961 as they did 20 years ago, slightly over 1,700,000. But the number of cars awaiting repairs on July 1, 1961 was 9.1 per cent of the ownership; it averaged 5.4 per cent in 1941. In 1944 the bad order ratio averaged 2.7 per cent when war traffic made it necessary to maintain cars and keep them serviceable.

More good freight cars are vital. When we say "good" we mean cars designed for the job for which they are intended and built to operate at high speeds with minimum maintenance. Over 50 per cent of the present Class I railroads' car fleet is 16 or more years old; over 20 per cent is more than *30 years old*. Cars in these age brackets can be kept serviceable but such equipment of almost obsolete designs would be a handicap to the railroads if they are called on to produce the ton-miles of which they are capable. About half of the fleet should be replaced.

We are indeed fortunate that so many excellent freight car designs have been developed during the past few years, more than in any comparable period. The railroads are in a favorable position in this respect; the time-consuming engineering and testing has been completed. All that is needed are for orders to be placed to get production of first-class rolling stock on its way.

No magic wand will produce freight cars. That takes planning, materials, components and lots of elbow grease, but first of all it requires that orders be placed. No orders, no cars. It's as simple as that.

There were only 11,821 freight cars on order and undelivered on July 1, 1961, a mere handful of the several hundred thousand of cars the railroads need so urgently in an emergency. We know that cars in these quantities can not be produced as a short-range objective. But we believe that every car-producing plant should be operating now at full capacity. Anything less would be short-sighted thinking.

Such a program requires money as does the build-up of all defense measures. Because defense measures during a national emergency would be the cause of an abnormally high traffic burden being placed on the railroads it is logical that equipment required to move that traffic should be also treated as a defense measure. Through accelerated depreciation or by subsidies the money for the build-up in railroad equipment should be made available.

We sincerely hope that a national emergency never materializes but we believe that the railroads, the nation's key transportation system, should be prepared and ready for such an event.

A Reminder

The September mechanical department meetings and exhibits are about a month away. Business meetings and presentation of reports start Monday morning, September 11, at the Hotel Sherman, Chicago. But registration starts Sunday, September 10, and exhibits will also open on Sunday.

We know that the four Coordinated Associations—Air Brake, Car Department Officers, Locomotive Maintenance Officers, Railway Fuel and Operating Officers—have completed their programs (RL&C, June, 1961, p 5). We also know that about 120 supply companies of the Allied Railway Supply Association have already taken exhibit space at the Sherman to show and demonstrate new and improved products. And at the last count 34 companies will have track exhibits at the 31st Street Yard of the Illinois Central along Chicago's lake front. Bus transportation between the hotel and track exhibits will be furnished by Allied.

Everything is being readied for what promises to be an outstanding convention of associations whose annual meetings through the years have been noted for their excellence.

We urge all mechanical department officers and supervisors, who can be spared from their duties, to attend. Get there early, if possible, and take advantage of the opportunity to register and inspect the exhibits on Sunday. We are sure that every man in attendance and his railroad can benefit by participation in these meetings and exhibits.



Full-scale railroad diesel engine tests lubricants in Shell's Martinez laboratory. Talona RS Oil 40 passed rugged 1000-hour test in this engine, was then released by Shell Research for intensive field trials.

BULLETIN:

Railroads report that diesel locomotives using Shell's Talona RS Oil 40 can run for more than 250,000 miles without an oil change

Diesel locomotives used to require an oil drain every 30,000 to 50,000 miles. Now, even locomotives in heavy-duty freight service are rolling 250,000 miles—and more—without an oil change. The reason: Shell's Talona® RS Oil 40. Read how this new lubricating oil can trim operating costs for you.

UNDER normal railway operating conditions, Shell's new Talona RS Oil 40 can be used from overhaul to overhaul without draining.

And with Talona RS Oil 40, railroads are finding that they can extend intervals between engine overhauls. Often, by substantial margins.

Five key reasons

Here are some of the key reasons for the outstanding performance records that this new diesel lubricant is making:

1. Talona RS Oil 40 contains special additives to resist oil oxidation. This allows the oil to lubricate effectively, without excessive thickening, even in prolonged heavy-duty freight service.

2. Talona RS Oil 40 has good detergent-dispersant qualities. It helps keep engines exceptionally clean.

3. Talona RS Oil 40 contains alkaline additives to help neutralize damaging acids—a major cause of engine wear in diesel locomotives.

4. Talona RS Oil 40 provides outstanding protection for silver bearing surfaces.

5. Talona RS Oil 40 has excellent filterability—a must for locomotive diesel oils.

NOTE: *All U. S. railroad diesel engine manufacturers have endorsed Shell Talona RS Oil 40 for use in their equipment.*

Your Shell Railroad Service Engineer will give you the details. Or, write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

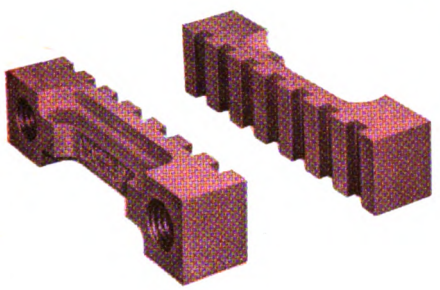
SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are working to provide better products for industry

STABILIZED JOURNALS—

Now MAGNUS offers you three low-cost ways to get

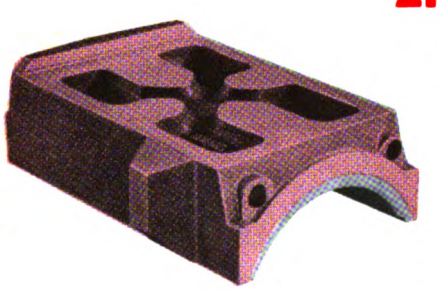
BETTER BEARING PERFORMANCE



1. MAGNUS R-S JOURNAL STOPS

Provide maximum stabilization of entire journal box assembly—increases miles per hot box ten times

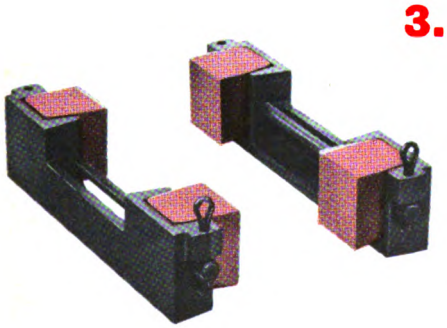
Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures—increase miles per hot box *ten times;* miles per cut journal, *fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.



2. MAGNUS FLAT-BACK SOLID BEARINGS

Wider, non-tilting design limits bearing displacement—provides effective stabilization at lower cost

The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust-guard, reduces loss of oil through enlarged dust-guard openings and tends to prevent spread linings in the bearing.



3. MAGSTOPS

Offer the inherent advantages of R-S Journal Stops in a low-cost, rugged, fabricated design

Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The next big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

MAGNUS METAL CORPORATION

Subsidiary of

NATIONAL LEAD COMPANY

GEARED TO PROGRESS P R I METER

Rio Grande Measures Ring Wear

Cooperative program used radioactive tracer methods to determine what causes wear of compression rings

Piston ring design, injector design, fuel quality, and operating conditions all play roles in the wearing of compression rings in diesel engines. Radioactive tracer techniques have recently been used by the Denver & Rio Grande Western to determine the effects of various factors.

"Great potential value can be realized from radioactive wear tests of chromium-plated rings because of the possibility of examining the many parameters which simultaneously affect the wear rate of ring face and side," the test report concluded.

In the radioactive wear tests, conditions definitely favored cast-iron compression rings which showed only a slightly higher wear rate than chromium-plated compression rings. In actual locomotive operation, conditions are quite different. Variables of primary importance such as air filtration, quality and filtration of fuels and lubricants, and general engine maintenance, can greatly affect compression ring performance. Under actual railroad operating conditions, abrupt changes in engine speed and horsepower produce an environment for the piston ring assembly which is "other than favorable." Cylinder lubrication rates, temperatures in the power assembly, and many other variables, do not remain constant, increasing the demand on the rings. "It is only logical, to assume that in the operating locomotive engine, the superior wear characteristics of the chromium-plated compression ring will be pronounced," the researchers decided.

The cooperative test program, conducted by the D&RGW, Standard Oil of California and Electro-Motive, measured the effect of several engine design variables on ring wear in a GM Model 16-567C diesel engine. Tests conducted with a high quality distillate fuel and also with a mid-continent crude oil, evaluated the following engine design variables: unit fuel injectors; compression rings; and oil control rings.

Tests were conducted with the 1750-hp, 567-C engine in a D&RGW GP-9 locomotive. Two General Motors unit injector designs were installed in the engine during the tests. The first, supplied with the engine as original equipment, was the spherical-valve injector which has relatively low nozzle opening pressure. The second type, now standard in the Model 567-D Series diesel engines, contains a differential needle valve.

Both cast-iron and chromium-plated compression rings were tested. The cast-iron ring has grooves in the ring face which are filled with black magnetic iron oxide. The chromium-plated ring is a cast-iron ring, the face of which is threaded and then plated with hard chromium.

Oil control rings were of two different types. The first, often referred to as the "double hook" type ring, consists of a ring, independently loaded, containing two hooked scraping edges on the ring face. The second design is a conformable ring, spring loaded to provide a relatively uniform radial pressure.

Four different piston ring assemblies were selected for evaluation. With the exception of one, each represents a ring combination which has been utilized in Model 567-A, B, and C Series diesel engines.

Piston Ring Assembly 1 consisted of three cast-iron, filled-groove compression rings, and two double hook oil control rings. This particular ring assembly was the standard for many years in the 567 engine.

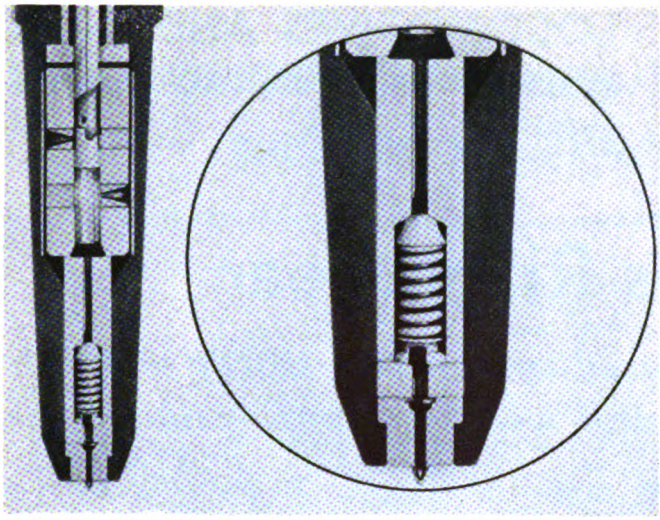
Piston Ring Assembly 2 differed from Assembly 1 only in that it had spring-loaded, conformable-type oil control rings. This combination, not recommended for 567 engines because of the severity of oil control, was selected for test only to provide a comparison of the two different oil control ring designs.

Piston Ring Assembly 3 consisted of a chromium-plated top compression ring, a chromium-plated second ring

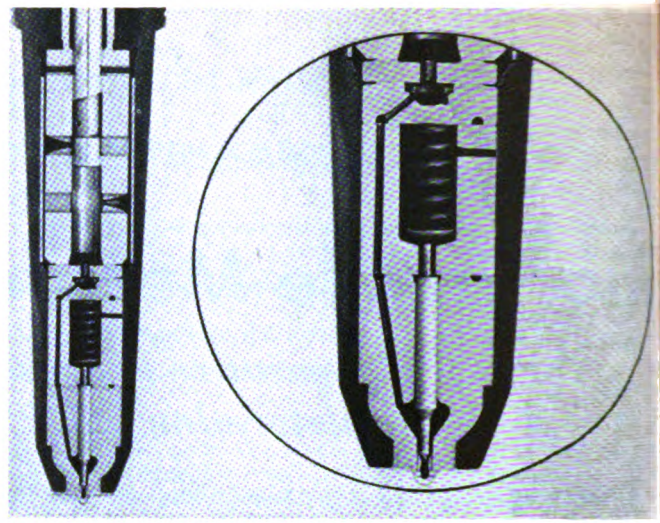


Radioactive testing was done on standing GP-9 unit in Denver; other data used in study came from units operating on D&RGW and on other roads which made their test results available.

Based on a paper, Effect of Engine Design Variables Upon Compression Ring Wear as Determined by Radioactive Tracer Technique, by J. J. Martin, fuels and lubricants engineer, D&RGW, and H. A. William, engine design section, engineering department, Electro-Motive Division, presented at the recent meeting of the Society of Automotive Engineers in St. Louis.



Spherical valve injector, EMD standard for years, is characterized by "low" nozzle pressure of 1,100 psi and "large" volume below valve.



Differential needle valve injector, D&RGW found, is superior atomizer with fast, positive cut off; valve opens at 3,000 psi.

(with increased side clearance), a tapered-face, filled-groove cast-iron ring, and two double-hook oil control rings. The arrangement is used on the 567-C engine.

Piston Ring Assembly 4 was similar to Piston Ring Assembly 3, differing only with respect to the oil control rings where the springloaded conformable type, used to decrease engine lubricating oil consumption. Piston Ring Assembly 4 is utilized in industrial applications of the 567-C Series engine where relatively high speed and moderate horsepower are required.

Cast iron pistons and cast iron cylinder liners were utilized in conjunction with all the piston ring assemblies. To provide a broad basis for comparison, ring wear tests were conducted with a high quality distillate fuel and with a mid-continent crude oil. Throughout the test the distillate was supplied to the engine at a temperature of approximately 110 deg F with a viscosity of 33 SUS. The crude oil was heated to a temperature of approximately 150 deg F and supplied to the engine at a viscosity of approximately 72 SUS. New RPM Delo lubricating oil was supplied to the engine for each individual test, eliminating the lubricating oil as a test variable. Oil-bath engine air intake filters minimized the effect of air-borne contaminants on the ring wear. To obtain maximum contrasts in ring wear rates with distillate and crude oil, only coarse, single pass fuel filtration was provided. As the radioactive tracer technique employed in these tests depends entirely upon the presence of radioactive material in the lubricating oil, the lubricating oil filters were bypassed, preventing filtration of radioactive debris.

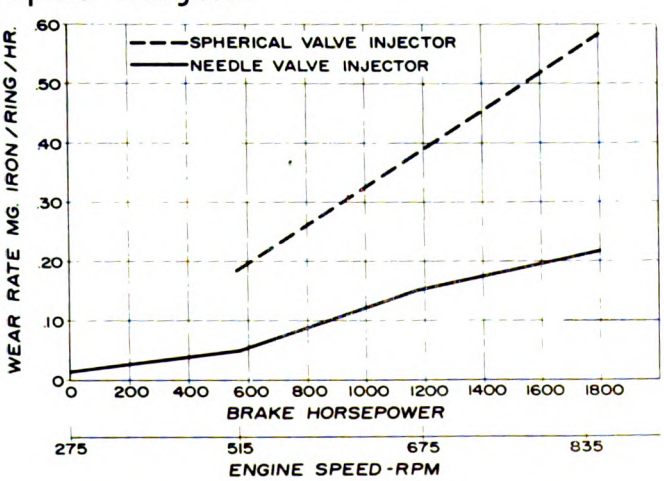
New piston rings were sent to Brookhaven National Laboratory where they were irradiated in a research reactor and returned to Denver. These radioactive rings were installed in the second or No. 2 compression ring groove of 10 of the 16 cylinder assemblies of the engine. During any test, all 16 cylinders contained the same type of piston ring assemblies throughout.

Test Rings

The No. 2 compression ring was selected as the radioactive ring in preference to the No. 1 or top compression ring because most of the metal worn from the No. 2 ring appears later in the crankcase oil. A larger percentage of the metal worn from the top compression ring is apparently carried into the exhaust system.

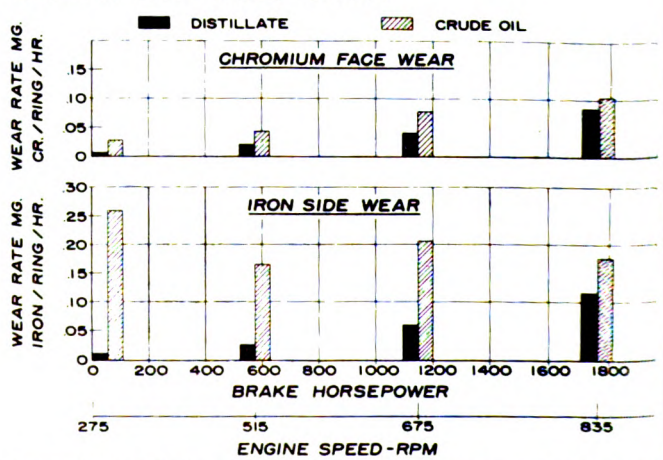
When evaluating oil control ring design the two oil control rings on each piston were changed without disturbing the compression ring assembly. By

Injector Design . . .



Cast iron compression rings were used in initial phase of test program which compared efficiency of two injector designs. The needle valve type was found to reduce ring wear by more than 60 percent.

Distillate and Crude Oil . . .



Comparison of distillate and crude oils was made with chromium-plated compression rings. Greatest difference in face wear occurred during idle operation. When engine operated on distillate, the iron side wear rate increased as engine speed and horsepower increased.

removing the connecting rod piston carrier assembly and lowering the piston in the cylinder liner until the two oil control rings were exposed, they could be changed and the piston raised until the oil control rings were again inside the cylinder bore.

All tests were conducted with performance simulating actual railroad operation. Ring wear data was obtained from operation at idle speed and throttle positions 4, 6, and 8. All tests were conducted at the D&RGW Burnham Shops in Denver, Colo. Each run averaged 5½ hr at the designated throttle position. Important engine operating parameters were measured hourly during the tests.

Lubricating oil was pumped from the engine crankcase, through a heat exchanger, through two counting wells (in series) and then back to the crankcase. The first counting well contained a cluster of four Geiger-Mueller tubes and the second well contained a scintillation crystal. The Geiger-Mueller tube counts were registered on a decimal scaler which, in turn, was connected to a printing clock. When greater counting accuracy was desired, the scintillation crystal was used. During tests involving chromium-plated rings, the scintillation crystal was required to measure the level of activity of both chromium and cast iron in the lubricating oil. With a pulse-height analyzer, it was possible to measure both Chromium-51 and Iron-59.

During installation, test and removal of radioactive piston rings, measures were taken to maintain radiation exposure of personnel well below the permissible limits. The area surrounding the entire locomotive was carefully monitored to determine radiation levels.

In analyzing the results it was found that the needle-valve injector reduced cast-iron compression ring wear more than 60% when compared with the spherical-valve type. The spherical-valve injector has a relatively low nozzle opening pressure of 1100 psi, a large volume within the injector between the flat check valve and the orifices, and an orifice length-to-diameter ratio of 2.1. The needle-valve injector has a nozzle opening pressure of 3000 psi, an extremely small volume between the valve seat and orifices, and an orifice length-to-diameter ratio of 1.1.

Needle-Valve Injector

The needle-valve type is the superior atomizer and provides a fast, positive cutoff at the end of each injection. It was firmly established that the needle-valve injector improves combustion and thermal efficiencies.

Conclusion of the research men was that reduction in the quantity of carbonaceous products of incomplete combustion is responsible for the relatively low ring wear rates measured with the needle-valve design. Because of its performance this injector, was utilized throughout the remainder of the tests.

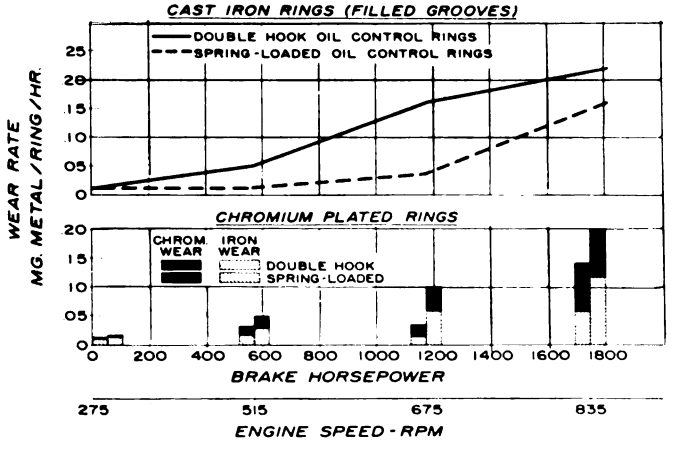
Chromium-plated compression rings showed slightly less wear than cast-iron rings. Total ring wear increased with an increase in brake-mean-effective pressure. Under conditions of higher speed and horsepower, the chromium-plated ring produced less wear than the cast-iron ring. Results do not indicate a very large difference in wear rates for the two ring designs. At idle and throttle position 4, rates for the two rings were identical.

With the same piston ring assemblies and a mid-continent crude oil, comparative wear rates were again measured. The wear rate of cast-iron compression rings was consistently higher than that of chromium-plated compression rings, the greatest difference occurring at rated engine speed and horsepower. The total wear rate of chromium-plated rings appeared to remain approximately the same over the full operating range of the engine. Assuming the side wear of both ring designs to be similar, the wear rate of the cast-iron ring face is twice that of the chromium-plated ring face in throttle position 4 and more than 400% higher in throttle position 8.

Comparison of wear rates obtained with chromium-plated compression rings during engine operations on distillate and crude oil showed that, with either fuel, there was an increase as engine speed and horsepower increased. The greatest difference in face-wear rates occurred during idle operation on crude oil when face wear rate was then only 20% under that at full horsepower.

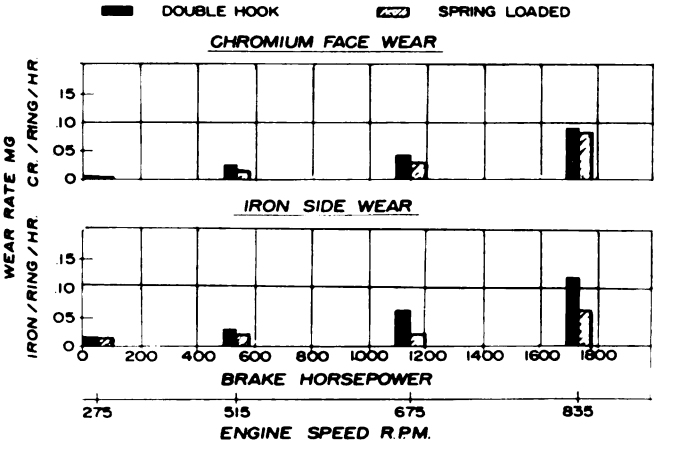
During engine operation on distillate fuel, side wear of the rings increased as engine speed and horsepower increased. When crude oil was supplied to the engine, iron side wear of the chromium-plated compression ring increased as engine speed and horsepower decreased. At idle, side wear rate was 25 times greater with crude oil than with distillate. Because engine combustion efficiency will be

Oil Control Rings...



Oil control ring design can have an effect on compression ring wear. With either cast-iron or chromium-plated rings, the wear rate was lower with spring-loaded oil control rings. At rated engine speed and horsepower, the wear of compression rings was down 30 percent.

Face and Side Wear...



Face and side wear rates vary. Using chromium-plated rings and burning distillate fuel, the rates were measured with different oil control rings. More effective oil control was thought to carry less abrasive to rings; less lubricating oil is oxidized.

adversely affected when operating on crude, abrasive particles are deposited not only on the cylinder liner surface but are scraped into the ring grooves. This increases wear rates of ring face and side.

With either cast-iron or chromium-plated compression rings, the wear rate was lower with spring-loaded oil control rings than with double-hook rings. The greatest difference in wear rates occurred at intermediate throttle positions. At rated engine speed and horsepower, the spring-loaded rings reduced total compression ring wear approximately 30% with either compression ring design.

Oil Consumption

The double-hook oil control ring is nonventilated and is independently energized. The spring-loaded control ring is ventilated and is energized by a coil spring which forces the ring against the cylinder wall. Calculated radial pressure for the spring-loaded ring is approximately 40% greater and the pressure is more uniformly applied.

During wear tests involving the four piston ring assemblies, attempts were made to obtain accurate measurements of engine lubricating oil consumption. Because of the relatively short duration of each test, this information could not be determined accurately. Instead, the relative lubricating oil consumption for four different piston ring assemblies in Model 16-567-C engines was obtained from actual railroad operation of 147 GP-9 locomotives on distillate fuel. The relative lubricating oil consumption obtained with Piston Ring Assemblies 3 and 4 indicates that a reduction of 45% in lubricating oil consumption is established when, in combination with the chromium-plated compression ring-assembly, spring-loaded oil control rings are substituted for the double-hook type.

While spring-loaded oil control rings reduced the wear rates of both the chromium face and iron side of the chromium-plated compression ring, there was a greater reduction in wear of the iron side.

An explanation for the wear reduction with spring-loaded oil control rings is that the lubricating oil serves as a vehicle for carbon particles, airborne contaminants, and wear debris in the cylinder, and the reduction in oil supplied to the compression ring zone subsequently reduced ring wear. Another reason could be that the carbon formed by partial oxidation of lubricating oil was reduced when oil supply to the compression rings was reduced.

Road Tests

Actual piston ring wear data has been obtained from cast-iron and chromium-plated compression rings removed from two D&RGW GP-9 locomotives having Model 16-567-C engines operating for three years with the same lubricating oil used in the stationary tests.

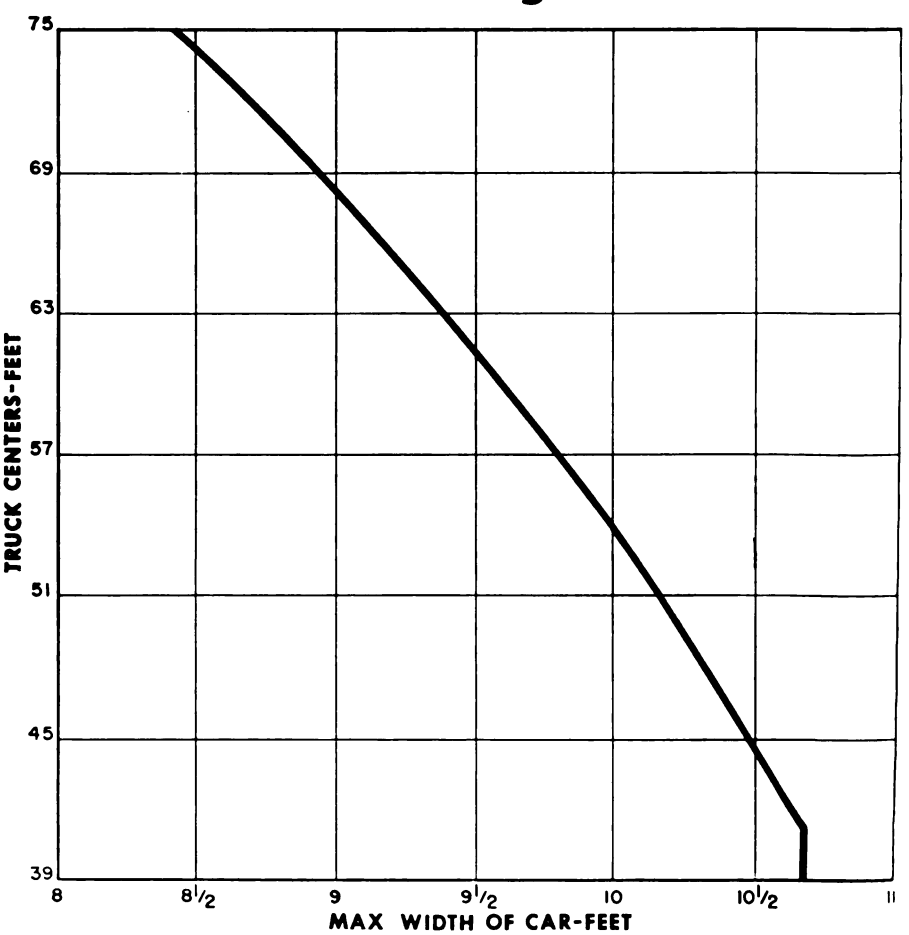
The engine in locomotive No. 5912 had been equipped with three chromium-plated compression rings and two double hook oil control rings. This piston ring assembly differs only slightly (No. 3 ring only) from Piston Ring Assembly 2. Locomotive No. 5913 contained Piston Ring Assembly 1, consisting of three cast-iron compression rings and two double-hook oil control rings. Both engines had spherical-valve injectors, and operated principally on distillate fuel.

Measurements indicated the superior performance of the chromium-plated compression rings. Not only did chromium-plated compression rings show reduced face wear and produce more uniform wear between rings in the assembly, but the data indicated more uniformity between that side and face wear.

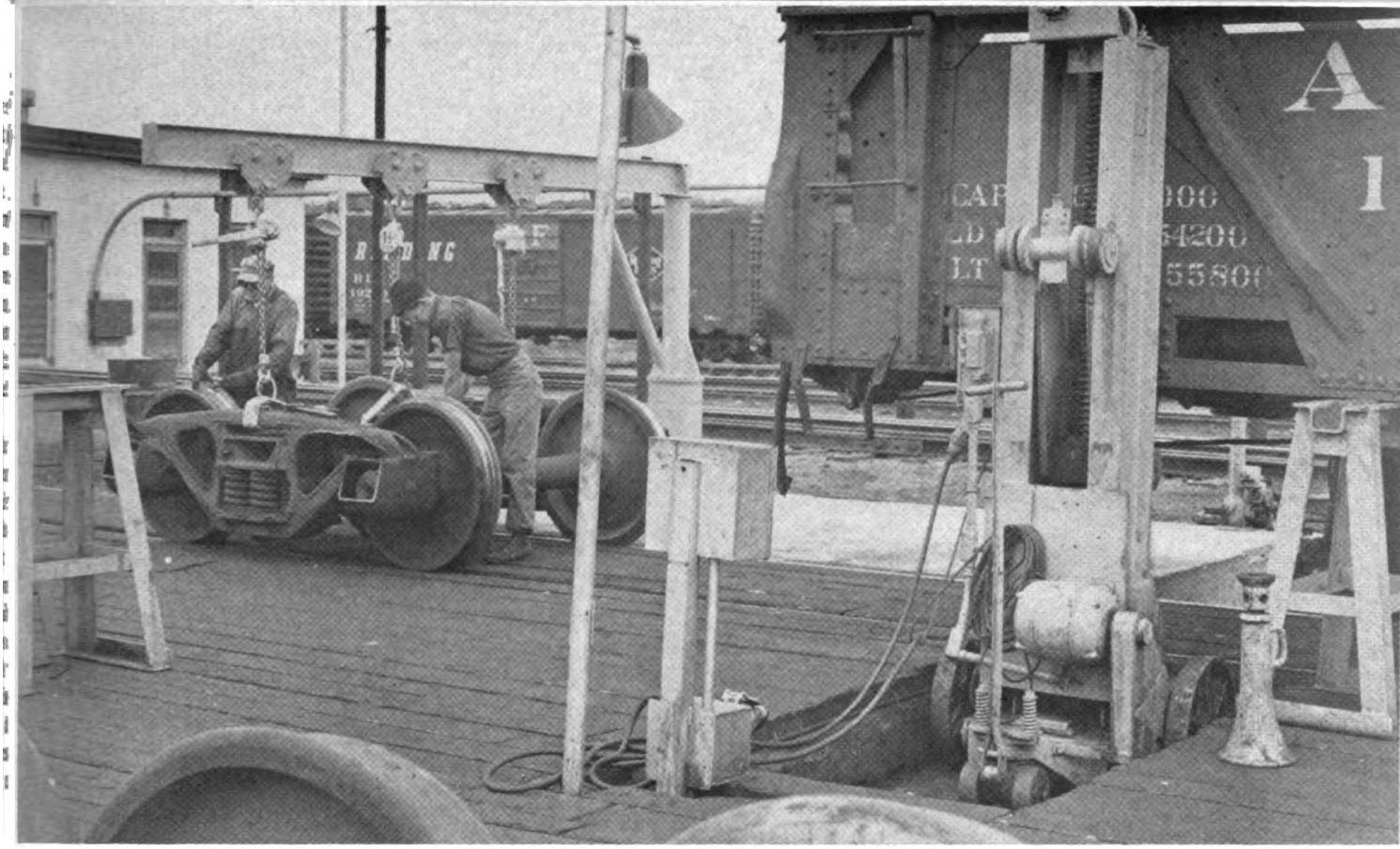
An unexpected result of all the tests was the relatively high side wear experienced with chromium-plated rings. In almost every instance the side wear was greater than the face wear.

Wear results from No. 2 compression rings in engines on other railroads indicate face wear is sometimes equal to, but is more often several times greater than, side wear. The relatively low face wear rates obtained during radioactive tests probably resulted from the favorable operating conditions which prevailed.

New AAR Clearance Diagram



Limiting of cross-sectional dimensions of freight cars has been under study by the Mechanical Division for several years. At the recent annual session, the Committee on Freight and Passenger Car Construction proposed limits on long cars. There would be no change in the basic diagram, "Plate B—Equipment Diagram Unrestricted for Interchange Service," in the Manual. Proposed, and currently subject to letter ballot, is this graph to be designated: "Plate B-1—Maximum Width of Cars with Various Truck Centers."



Jib crane with three hoists is used for fast wheel changes; jacks came to spot track when they were rated surplus by locomotive shop.

Milwaukee Has 'Home Made' Spot Shop

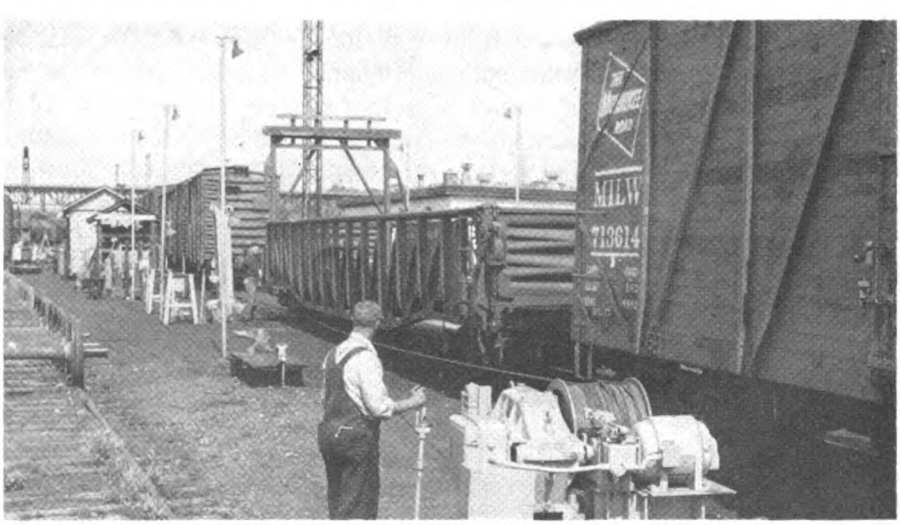
The facility recently opened by the Milwaukee Road at its Milwaukee, Wisc., yard has demonstrated for the railroad that a spot-repair system can produce savings even when a relatively small number of cars is handled. There is great contrast between this single-track, "home made" installation, and the four-track, highly mechanized plant put in operation at Bensenville, Ill., last November (RL&C, Feb. 1961, p. 32). Bensenville, the Milwaukee's largest yard, is just outside Chicago.

Located in the heart of the Milwaukee train yard, the compact, single track, does most of the jobs which are handled at the more elaborate Bensenville shop. Restricted in space, and constructed entirely of surplus material, this one-track, semi-automated, one-spot system can turn out as many as 30 cars per day on a three-shift operation. While not comparable in size or efficiency with the installation at Bensenville, it does speed light repairs on "hot loads," and supplements the work of the main repair track in Milwaukee.

The mechanized car puller was obtained from an old coal dock elevator motor. The electric jacks were formerly used in the diesel locomotive shop. Wheel changing boom cranes came from retired car shop equipment. The 60-ft repair platform was constructed from second-hand crossing planks and the concrete foundation blocks were removed from retired snow plows.

The repair track operates seven days a week, with two carmen on each shift. Bad order cars are switched to the inbound side of the repair tracks and positioned at the spot repair location by the car puller. Tools and materials are conveniently located. Adequate lighting is provided for night operation. Repairs include all types of light repair track defects such as air brake cleaning, journal repacks and wheel changes.

Milwaukee officials believe this repair track is one of the finest of the "home-made" variety. They say the convenient location in the train yard materially reduces switch engine hours involved in handling bad order cars. Faster repairs, it is estimated, save at least 30 days per diem during each 24-hour period.



Car puller moves repaired car from "spot" as whistle sounds to insure safe movement.



Glamor Gal of the PZR gets Oakite 202 beauty treatment

One of the truly unique railroads in America today is the Portland Zoo Railway (PZR) in Portland, Oregon. Launched in 1957 by men who know and love railroads, the project was built entirely with donations and the volunteer labor of thousands of Oregonians.

The PZR is a half-size system consisting of 26 units of rolling stock. Running on 2 miles of track, the units are made up into 5 trains—a 4-car diesel streamliner, an 1870 diamond-stack locomotive, a circus train, a work train and a fire train.

High on the list of items used by the PZR to constantly maintain itself as an efficient railway system is Oakite 202 for washing power units and cars. PZR officials and maintenance men of many of the nation's leading railroads were quick to recognize that the remarkable soil-dissolving and loosening ability of Oakite 202 assures effective cleaning with a minimum of time and effort. They saw for themselves that while Oakite 202 really goes after tough 'road soils, it is exceedingly kind to paint and metals.

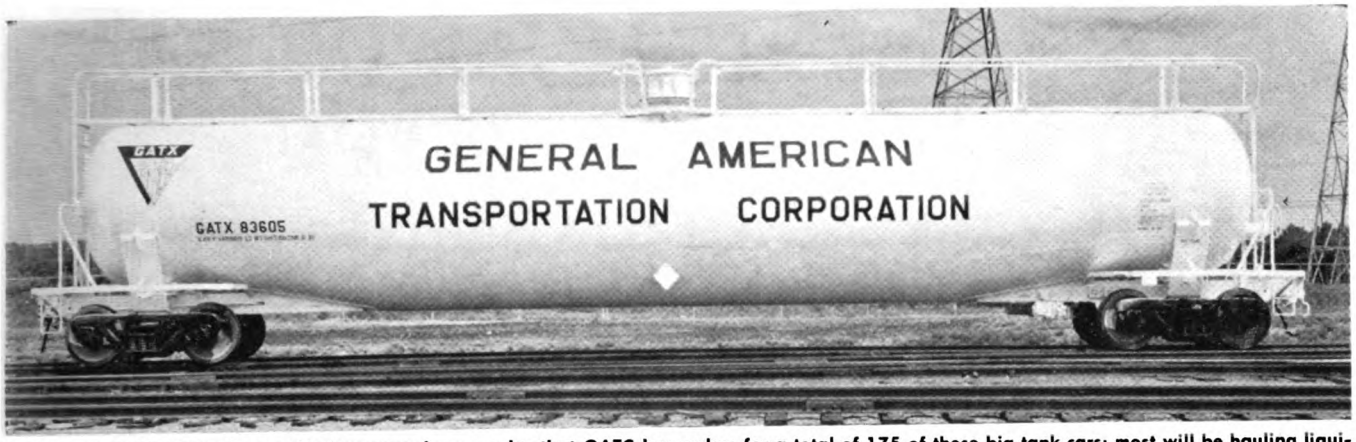
Call your Oakite man for an on-the-spot demonstration of Oakite 202. Or send for free brochure F-10696 to Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

At the A.S.A.R. Convention visit Oakite Booths 17 and 18

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Prototype with 30,300-gcl. capacity has proved so popular that GATC has orders for a total of 175 of these big tank cars; most will be hauling liquified petroleum gas. Already under consideration is a 45,000-gal. version which will require a different truck arrangement.

Unusual Tank Gives High Capacity

Increasing the diameter of the center section and eliminating the center sill have made it possible for General American Transportation Corp. to build a 30,300-gal. tank car only 66 ft long. Since GATC began delivering 50 of these high-capacity cars to Phillips Petroleum Co. in June, orders for 125 have been received from other shippers of liquified petroleum gas and anhydrous ammonia.

"This response to a new tank car of radical design is unprecedented," S. D. Moseley, GATC president said recently while commenting on his company's orders for 175 of these cars, all of which are to be completed at the Sharon, Pa., plant by the year's end. "Their use will permit greater speed and flexibility in delivery of products in comparison with smaller tank cars, barges, and in some cases, pipe lines.

While the 66-ft, 30,300-gal. tanker is its biggest to date, already General American is planning for even larger cars of the two-diameter tank design. Phillips Petroleum wants 45,000-gal. cars, and the GATC design could be lengthened to give this capacity. It would probably require the use of six-wheel trucks to keep wheel loads within acceptable limits.

The idea of maximum capacity in minimum length originated last year when a GATC engineer proposed picking up added capacity by increasing tank diameter between trucks, and making the tank function as a center sill between the bolsters. The resulting car, already nicknamed the "pregnant whale," has a center section of such large diameter that side running boards cannot be used. Instead, a full-length center running board extends down the top of the tank with ladders extending up to it at each end of the car. GATC says that the Interstate Commerce Commission has indicated it will take no exception to this arrangement.

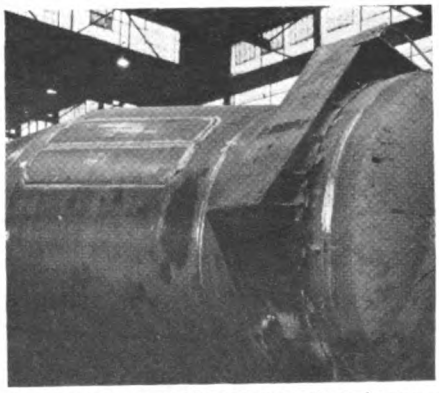
The large center section made it necessary to install separate brake systems for each truck. Each of the trucks is equipped with a separate Wabcopack brake unit with Cobra brake shoes. The AB valve and brake reservoir are mounted under the draft sill just inboard of the bolster at one end of the car.

The tank consists of eight rings fabricated from high-tensile steel and assembled by welding. Standard welding techniques could be utilized, although some special jigs had to be developed to weld the modified conical transition rings.

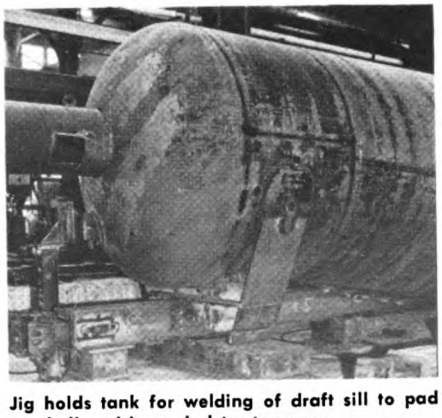
The pair of 99-in. diameter end rings, each 52 in. long, are located over the stub sills. Transition rings connect these end rings to the 118-in. diameter center rings, and are designed so that the top of the tank is level. Each of the transition rings is $107\frac{5}{16}$ in. long. The four center section rings are each 90 in. long. Center and transition rings are $\frac{15}{16}$-in. high-tensile plate; the end rings and ellipsoidal heads are $\frac{13}{16}$-in. plate. Center and end rings are fabricated from a single plate, the transition rings are each fabricated from two plates.

The tank is subjected to a 400-psi hydrostatic test and the safety relief valve is set at 300 psi. The tank is ICC Class 112A400-W.

Exhaustive tests at Sharon and East Chicago, Ind., showed General American that its big tanker had the ability to absorb high impacts. Coupler forces up to 1,200,000 lb were developed during tests in which a gondola with a gross weight of 250,980 lb was impacted against the tank car 30 times in the 10 mph range. When tests showed no design modifications to be necessary, production of the 175 cars was started.



Upper bolster is welded to the tank and assembly is then stress relieved as a unit.



Jig holds tank for welding of draft sill to pad on shell and lower bolster to upper.

Locomotive Replacement on the BURLINGTON



The Burlington has retired thirty-six 1350-hp freight locomotives and acquired thirty-six new General Motors 2000-hp GP-20's—turning in 48,600-hp capacity in exchange for 72,000-hp. (a gain of 48%). This added capacity enables the thirty-six new GP-20's to do the work of fifty-four older FT's. The Burlington has also significantly reduced maintenance and operating costs with these new locomotives. This is the essence of the General Motors Locomotive Replacement Plan.

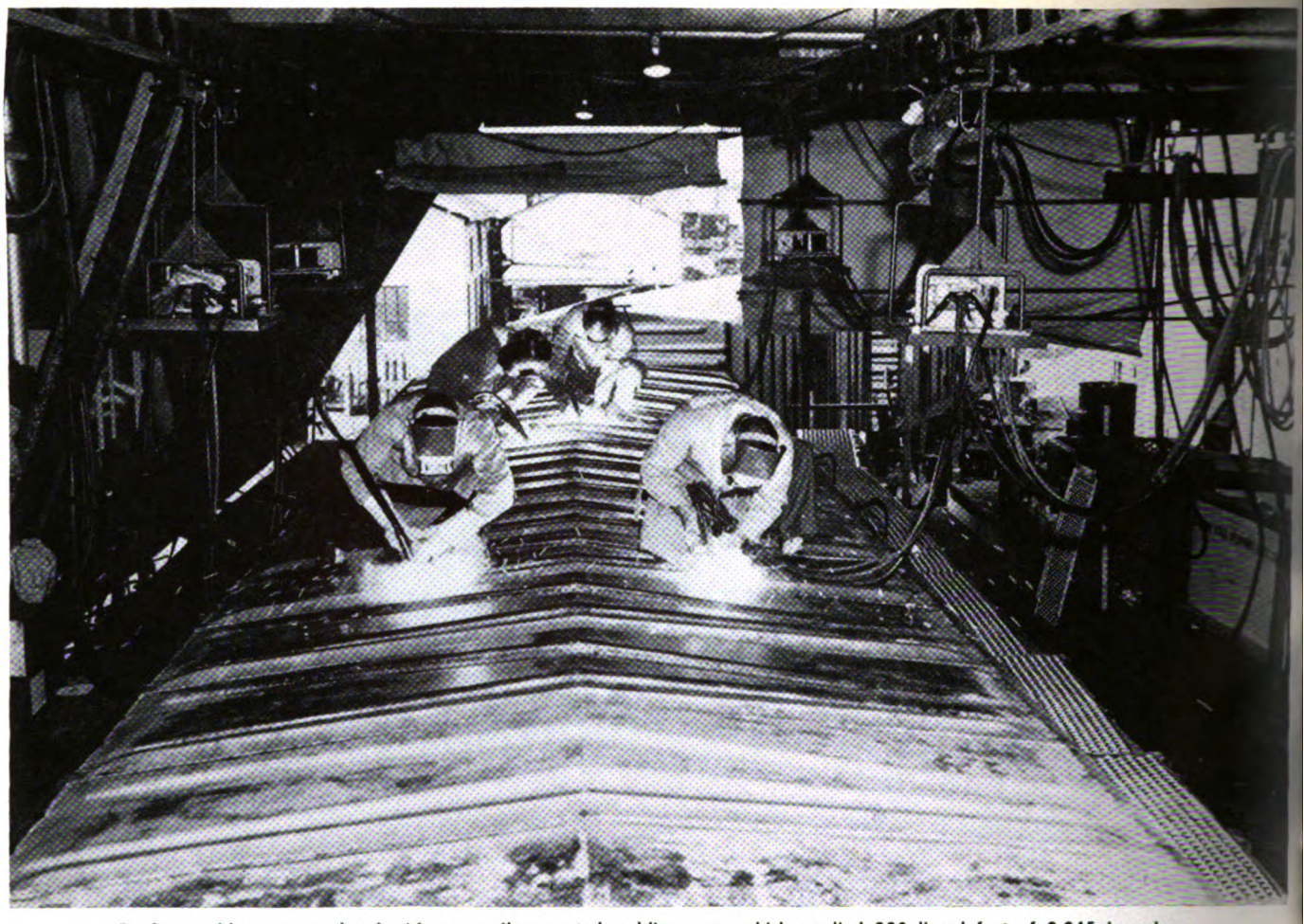
ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS • *HOME OF THE DIESEL LOCOMOTIVE*

In Canada: General Motors Diesel Limited, London, Ontario

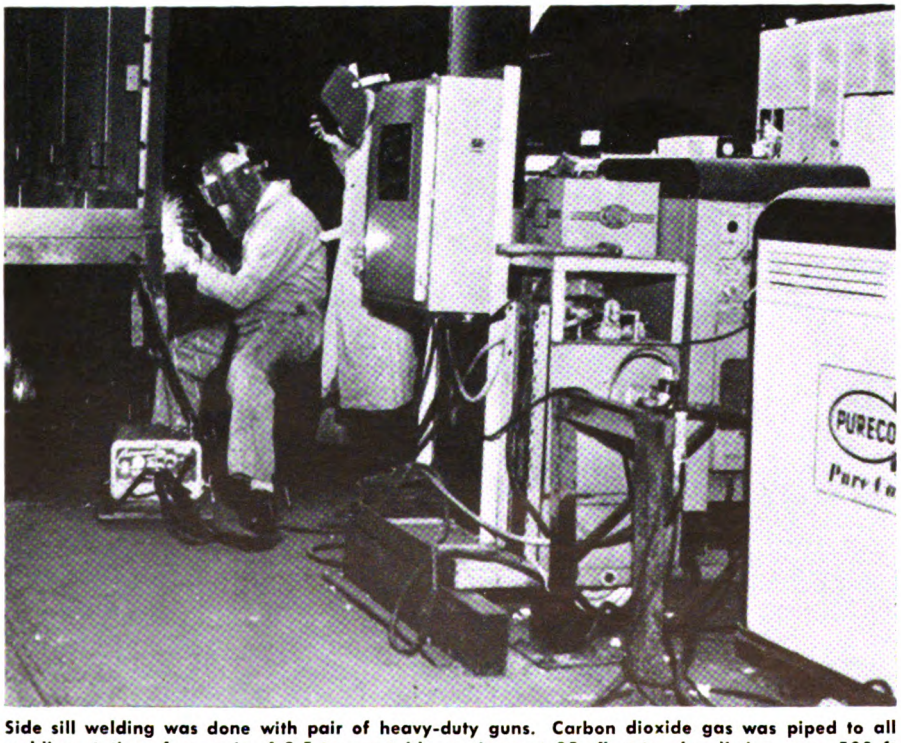
GENERAL MOTORS LOCOMOTIVES





Roof assembly was completed with monorail-supported welding guns which applied 300 lineal feet of 0.045 in. wire.

Welding Used for Reefer Assembly



Side sill welding was done with pair of heavy-duty guns. Carbon dioxide gas was piped to all welding stations from pair of 2.5-ton portable receivers at 35 cfh rate. In all there was 500 ft of welding on each car; this required about 30 min.

Welding has had an important role in the car building program recently completed by Pacific Fruit Express at its Los Angeles shop. PFE built 1,025 mechanical reefers — 1,000 all-purpose cars (RL&C, August 1960, p. 29) and 25 fresh-produce cars (RL&C, April 1961, p. 25).

After testing welding equipment, PFE chose Aircomatic machines to make the 500 lineal feet of welds needed for assembly of each car. All cars were built with prefabricated subassemblies shipped to the Los Angeles assembly lines by suppliers. About 40 lb of Aircomatic A675 wire was used in the assembly of each car; welding was done at two stations on the line.

At the first of these the side assemblies were welded to the side sills using a pair of Aircomatic No. 21 heavy-duty guns to make the 100 ft of weld with 0.035 in. wire. At another station galvanized roof sheets were welded with six guns powered by Bumblebee units.



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'EN UNDER A 70-TON LOAD one man can open this v gate. Accurately machined mating surfaces provide d-free operation and a tighter seal. No more sledging car damage in attempts to open "frozen" hopper doors. ctric steel castings eliminate distortion.

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Road's Largest Model . . .

SP Chip Cars Have Plywood Sides

Latest Southern Pacific wood chip cars have a capacity of 6,014 cu ft, an increase of 31 percent over the largest previous SP design which was the 4,589 cu ft model put in service in 1958 (RL&C, March 1958, p 39). Features of the new design are the plywood side sheets and the heavy side trusses. Transverse crossties at the top of the car have been eliminated.

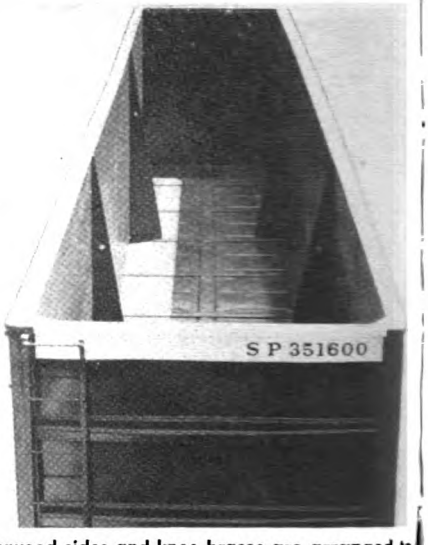
The 400 cars were built at the Clifton, N. J., plant of Magor Car Corp. The underframes, side trusses, and ends are welded assemblies fabricated of low-alloy, high-tensile steel plates and sections. Side framing consists of nine posts on each side, located at the crossbearers and bolsters, and eight diagonal braces between the posts. All are 6-in., 20-lb, wide-flange sections. The truss joint gussets are ⅜-in. steel plates welded to the posts, diagonals, side plate channels, and side sill angles. End sheets are $\frac{3}{16}$-in. welded to the end plate bulb angle, end sill angle, inside corner posts and end stiffeners.

Each car has twenty drop doors made of $\frac{3}{16}$-in. plate. Door operating mechanisms at the four corners of the car each operate a set of five doors.

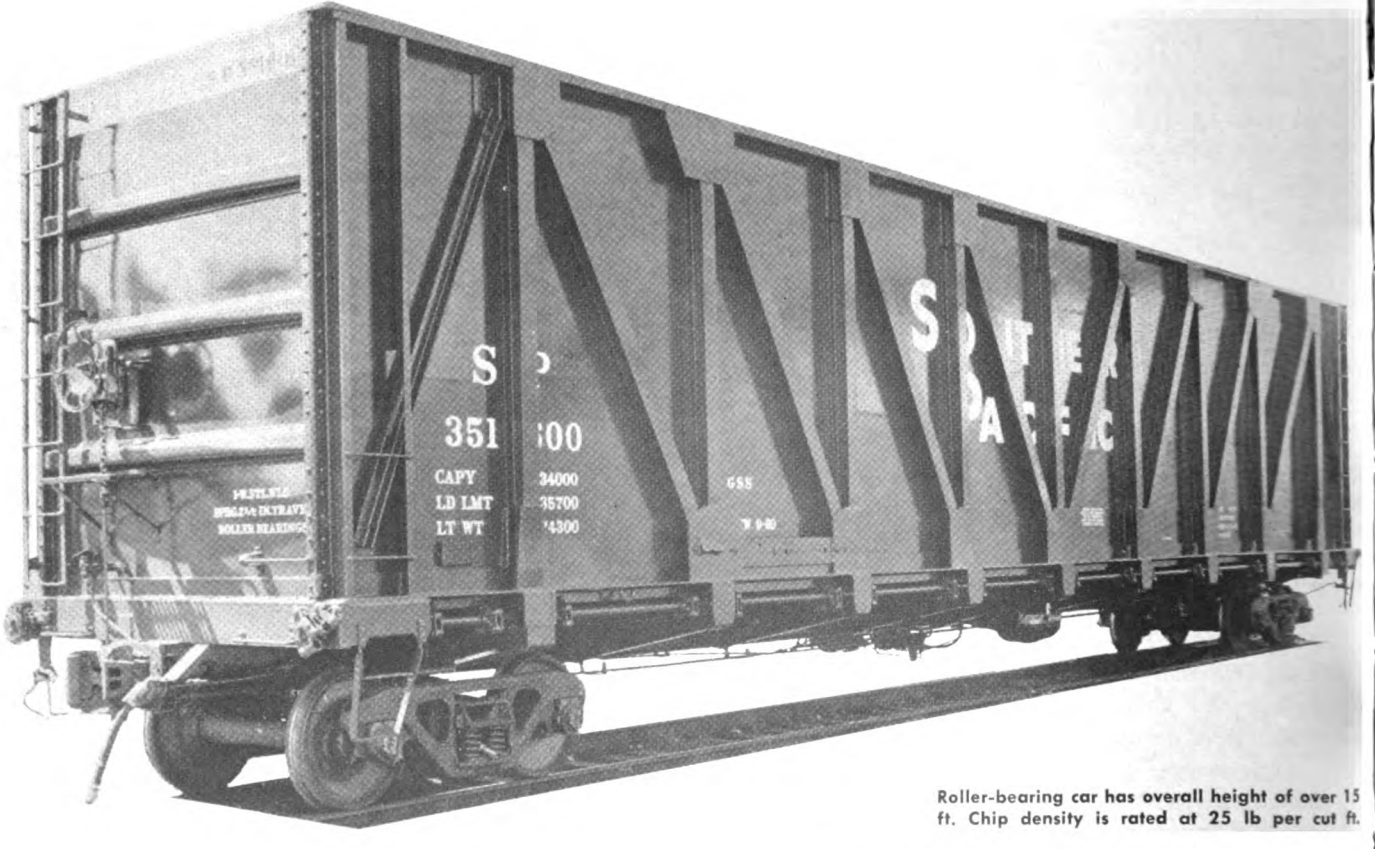
Side lining consists of five-ply, ¾-in. Douglas Fir plywood. Top and bottom edges of the lining panels are covered with 26-gage Galvannealed formed metal channels stapled to the plywood. The plywood panels extend longitudinally between corners of the car, running behind the pair of knee braces which support each side. The inside height of 11 ft is produced with three plywood side panels—the lower two of standard 48-in. width and the upper one a special 33-in. wide panel.

Panels are secured to the side framing with ½-in. type CPF Nelson welding studs and Nelson T-nuts. The studs are on 9-in. centers. After application of the studs, the nuts are turned flush with the plywood and riveted over. The smooth interior produced by the plywood and these fastenings facilitate the rapid unloading of the car.

Light weight of the completed car is 74,300 lb. Inside length is 60 ft $5\frac{5}{8}$ in.; inside width is 9 ft ½ in. Length over strikers is 62 ft 9 in.; outside width over the top of the sides is 10 ft 2¾ in.; height from rail to the top of the side is 15 ft $3\frac{5}{16}$ in.



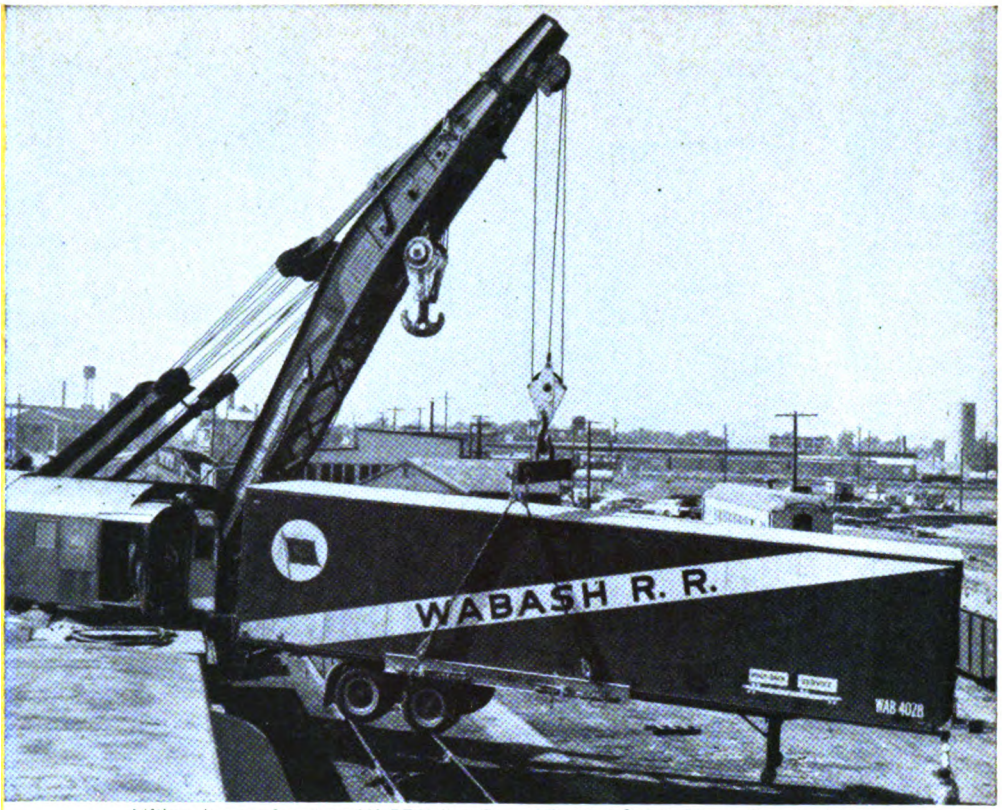
Plywood sides and knee braces are arranged to present a smooth interior which speeds unloading of the car. There are no crossties over the top of the car.



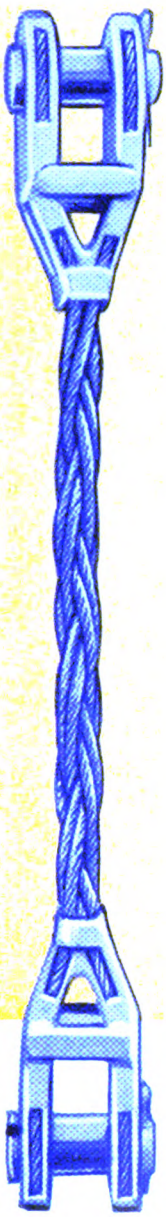
Roller-bearing car has overall height of over 15 ft. Chip density is rated at 25 lb per cu ft.

THEY PLANNED ON YELLOW STRAND TO HOLD DOWN COSTS

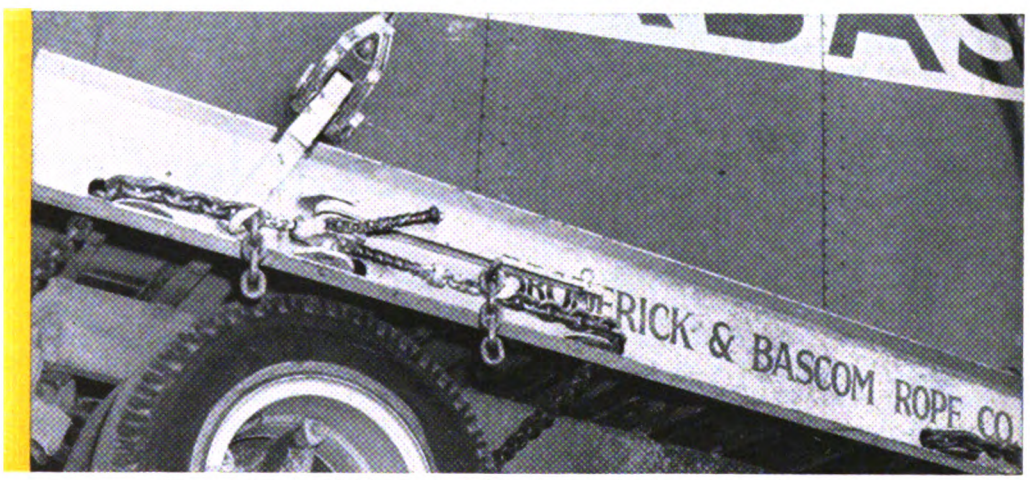
on piggy-back loading operation



Lifting rig uses four type M1-BT Yellow Strand Braided Safety Slings, 8 parts of ½" rope, and twin thimbles, allowing rope to run completely around thimble.



Type M1-TT Sling



Close-up showing hitching method. Alloy chain snubs channel-iron side rails tightly. Yellow Strand patented twin thimbles secure sling bridles to beam.

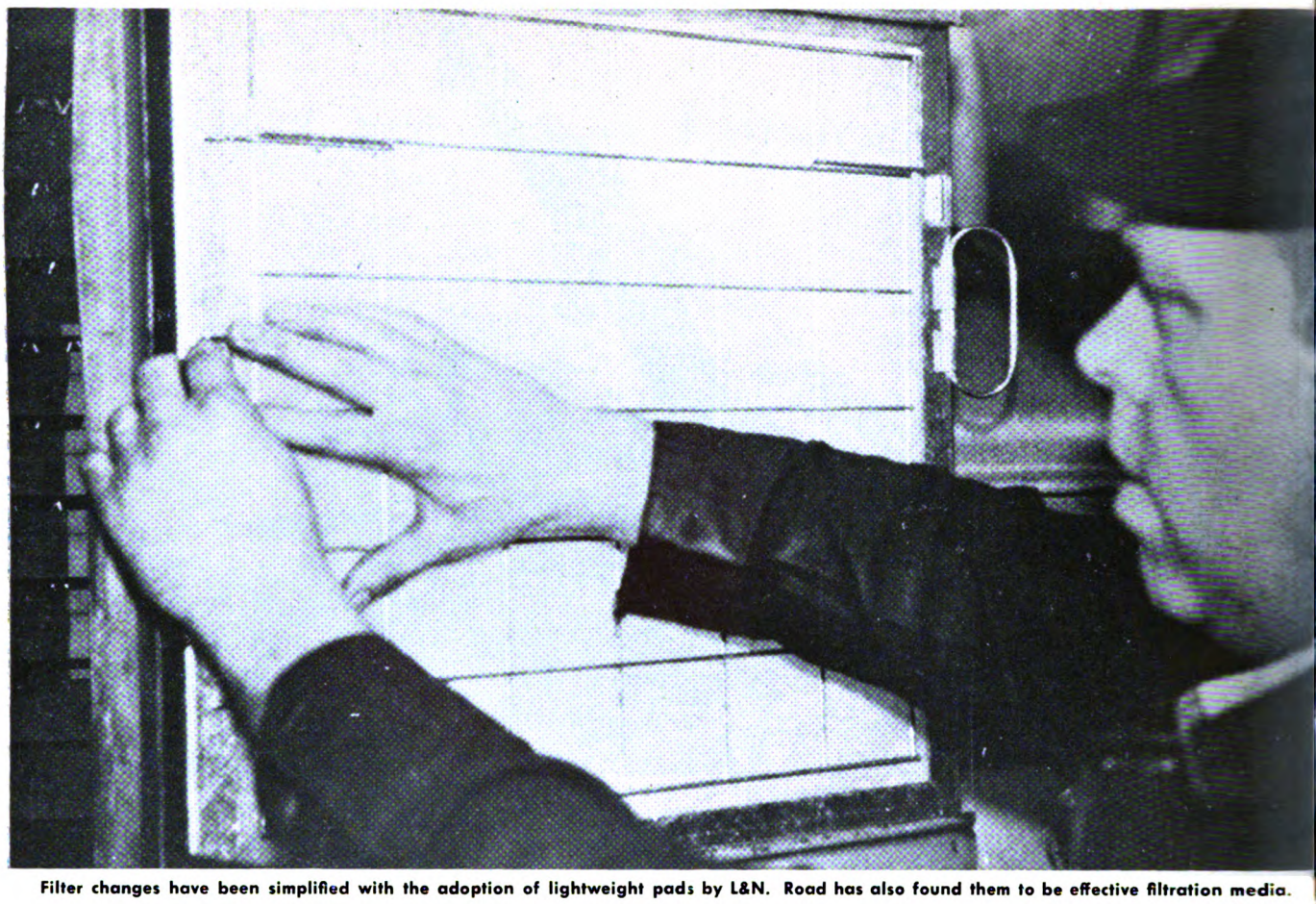
Yellow Strand Sling Experts and Wabash R.R. Develop Unique Low-Cost Piggy-Back Lift

One of the many advantages you get with Yellow Strand is service. Yellow Strand experts helped develop this economical lifting rig taking advantage of equipment already in use for other purposes. The assembly is versatile, quickly and easily applied, and handles different trailers with minimum adjustment. The strong, durable Yellow Strand Braided Slings will lift forty tons. What's your sling problem? Call your Yellow Strand representative anytime for expert help – for the very finest in all types of slings.

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Filter changes have been simplified with the adoption of lightweight pads by L&N. Road has also found them to be effective filtration media.

L & N Adopts Disposable Air Filters

Disposable air filters are saving money for the Louisville & Nashville. More than 300 of the road's diesel units are now equipped with these throw-away, glass-fiber filters. One hundred road units have them both for carbody and engine air-intake filtration, and they are used for engine air-intake filters on 211 switchers which were built without carbody filters.

The L&N mechanical department estimates that a 50% saving in air filtration costs results from replacement of the permanent panel-type air filters with the disposable glass-fiber pads.

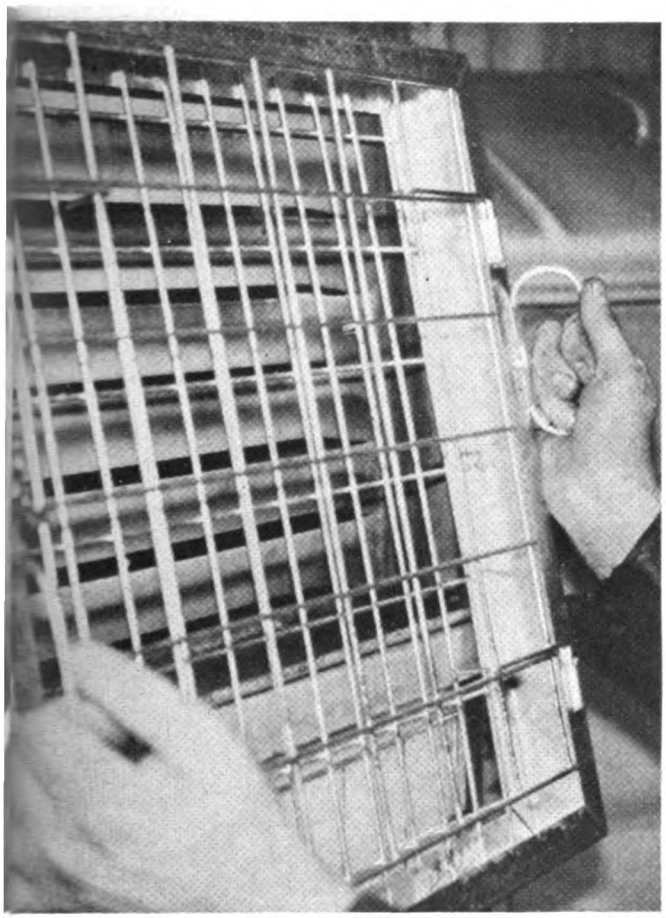
This filtering concept originated over ten years ago when S. C. Snow, now L&N superintendent of motive-power maintenance, purchased a standard glass fiber furnace filter at a local hardware store and built a holder so it could be tested on an EMD switcher.

In 1954, several more engine air-intake filter installations were made. Different arrangements were developed for testing. By 1956, the L&N found results so promising that it began to experiment with the replacement of the carbody filters on its road locomotives. It was determined that, either for carbody or engine filtration, it would probably be less expensive to throw the pads away than to transport, wash, and reoil the permanent type.

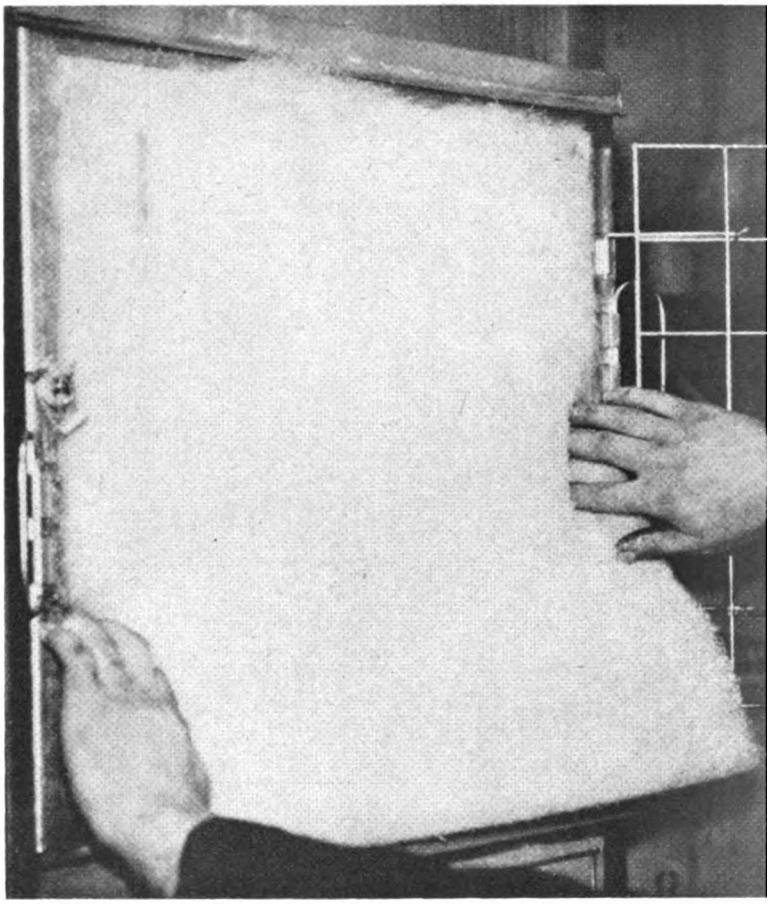
The railroad's development program had by this time involved American Air Filter of Louisville, Ky., a manufacturer of many different types of air cleaners. AAF proceeded to develop its Amer-Kleen filter specifically for locomotive and passenger-car service. This is a viscous impingement pad made of continuous, high-tensile glass fibers bonded together and then thoroughly impregnated with a gel-type adhesive during manufacture. The final form of today's Amer-Kleen pad has been an evolutionary process involving changes both in materials and spinning techniques. The filters are of graduated density, much more open on the inlet side than on the exit side. This allows the dirt particles to penetrate into the filter rather than loading the surface. As a result, dirt-holding capacity is materially increased. The filter's efficiency is also improved by this continuous fiber, and graded density.

In May 1958, the L&N applied Amer-Kleen filters to the engine air intakes of four EMD 4-unit F7 locomotives for thorough testing. At approximately the same time Amer-Kleen was also applied to Alco road units for test. While the permanent metal filters used on units in comparable service had to be removed, cleaned, oiled, and reapplied twice monthly, the disposable filters proved to be capable of operating for an entire month without attention.

It was found that a month's service would load one engine set of these disposable pads with up to 58 oz of dirt in normal freight service. Actually, it was found that most pads were still usable after a month, because the silicon, or air-borne dust, content never exceeded four parts per million in the engine lubricating oil. The road feels



Retaining frame is installed in same way as standard metal filter.



Glass fiber media is installed within the special retaining frame.

that the quality of filtration is improved and that considerably less silicon actually enters the engine.

Following the test program, the L&N undertook the installation of the disposable filters on all its switching locomotives. The switcher conversion was started in 1958 and completed in 1960. Switchers were put ahead of road locomotives because the L&N had calculated that there would be a much more rapid return on the investment in switchers.

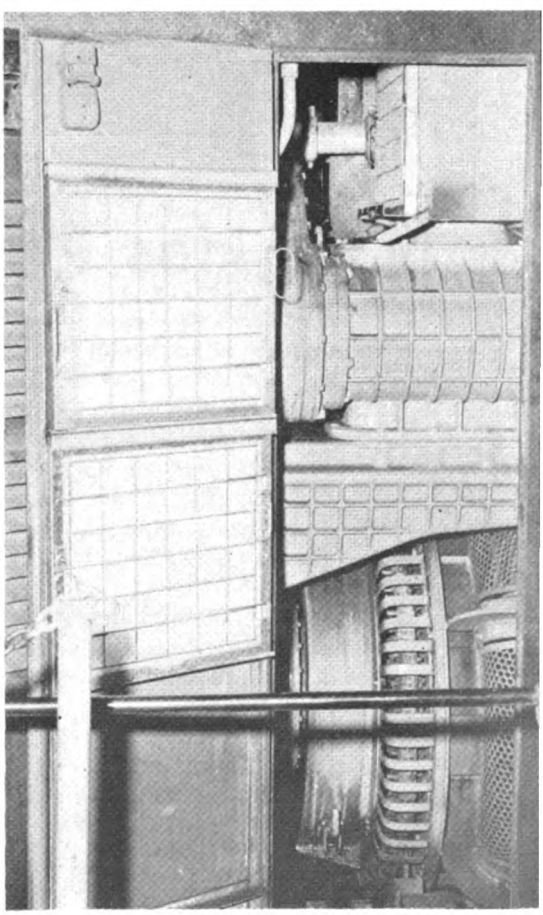
Along with the efficiency of filtering, the reduction in servicing has played a big role in the L&N's decision to adopt disposable filters. Already eliminated have been the cleaning facilities at 17 terminals out of which switchers operate. This means that, at these points, it is no longer necessary to stock solvent and filter oil, to supply steam, and to handle the permanent filters.

Filters can be changed wherever it is most convenient. Frequently, this is done at fueling stations. One man can easily carry all the pads necessary for a complete change even on a road unit with its carbody filters. This makes it unnecessary to move a heavy load of metal filters to the locomotive or to take the locomotive into a shop for a filter change.

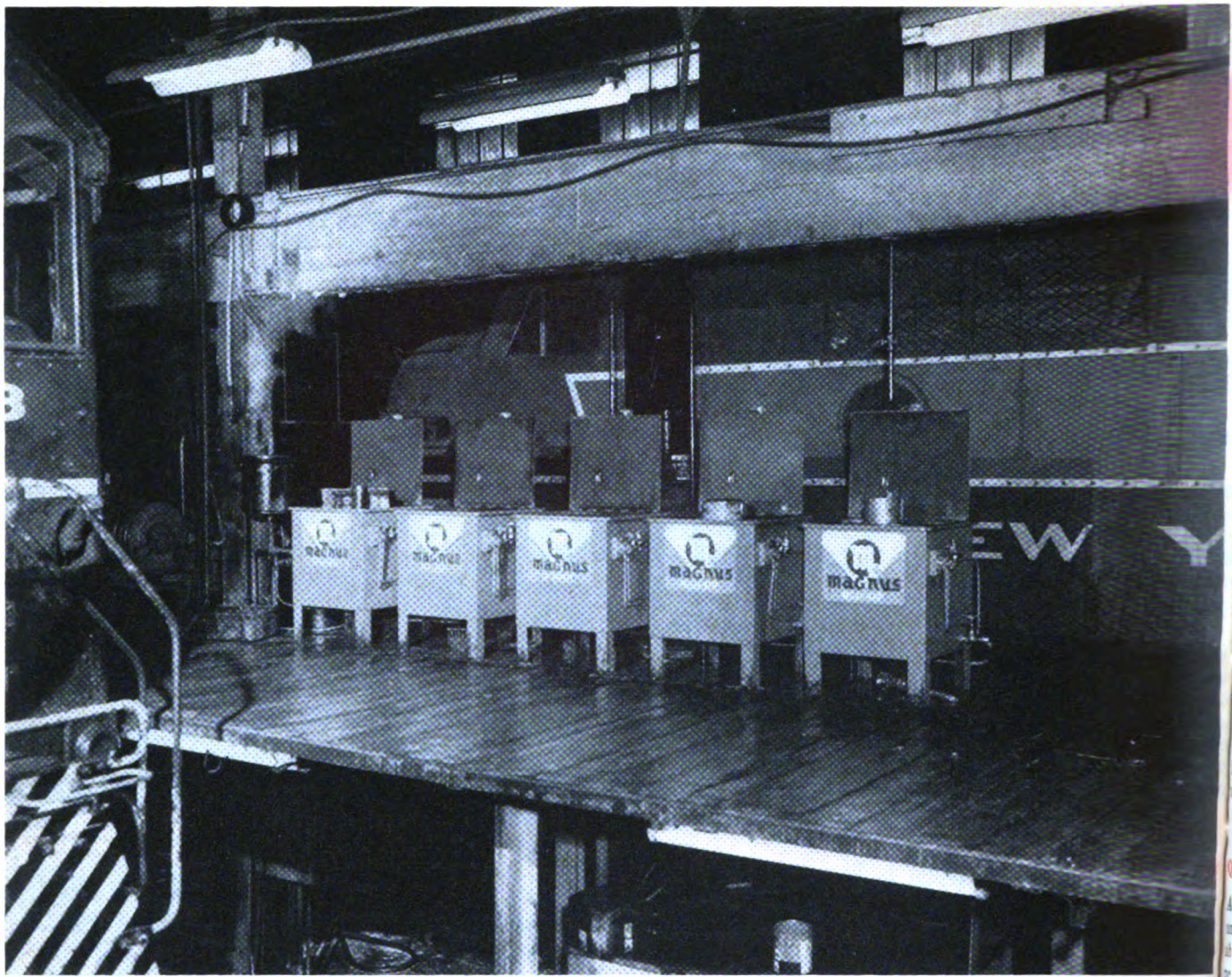
The locomotive installation consists of retaining frames installed in the regular filter holders. This frame, available both in 2-in. and 4-in. depths, is installed in the holder in the same way as the conventional metal panel filter. While it is never necessary to take the retaining frame away from the locomotives, it is frequently easier to remove the frame from the filter holder in order to place the media between the front and back grids.

The same size pad, approximately 4 in. deep, is compressed both in the 2-in. and 4-in. retaining frames to a thickness of 2 in. The 4-in. retaining frame is actually a 2-in. frame with metal extensions on the back to fill the full depth of the original 4-in. holder on the locomotive. Special retaining frames are available for new units.

The L&N finds the disposable pads operate satisfactorily for from 15 to 30 days. Its tests have indicated that, the glass-fiber Amer-Kleen filters are more efficient than the metal-panel filters, that the lightweight pads are easier to handle, and that the elimination of cleaning and oiling simplifies many terminal operations.



Carbody filters on hood doors and engine intake filters over blower are disposable pads.



Battery of five Magnus Miji-Lif machines comprises a production-line cleaning facility in the Collinwood diesel shop.

NYC Has Production-Line Cleaning

Cleaning plays an important role in the operation of the New York Central locomotive spot maintenance facility at Collinwood shop just east of Cleveland, Ohio. This six-spot operation handles the majority of the road's Electro-Motive units, most of which usually operate on the lines west of Buffalo.

Today, most NYC road freight and road switcher power is maintained and receives ICC inspections on spot lines either at the Collinwood facility, or at a similar shop at DeWitt, just east of Syracuse, N. Y., which handles most of the Alco units (RL&C, June 1961, p. 21).

With over 600 units assigned at Collinwood for maintenance and inspection, it has been important for the NYC to install tools and equipment so that work on the locomotives can be completed without interfering with movement of the line at 48-min intervals. Each unit spends 48 min at each of the spots, spending just under 5 hr on the line. Cleaning is an important phase of the periodic maintenance which is performed as a unit moves through.

The production line is set up along a raised platform with depressed working area underneath. Parts for replacement—gaskets, filter elements, strainers, and tools—are placed within easy reach of the mechanics.

The filter cleaning equipment is a complete departure from previous methods used by the New York Central. It consists of a bank of five Magnus automatic, mechanically agitated cleaning machines. Five machines are installed because different parts require different cleaning chemicals and individual cleaning steps.

Each of the five Miji-Lif machines is charged with a different Magnus cleaning solution, solvent, or oil. Filters, screens, and parts are cleaned by code, with the sequence of cleaning operations being determined by the type of soil to be removed and dependent upon metallic composition of the part itself. Machines are numbered 1, 2, 3, 4, and 5; parts are processed in various sequences.

Machine 1 contains a room temperature mixture of four parts of Magnus 755 to one part water. This chemical removes carbonized oil, sludge, and varnish from disassembled engine parts, filters, and strainers.

(Continued on page 32)

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Railway Executive News

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How hot should a hot box be?

Engineers get to heart of question to answer certain misconceptions

Since the early days of railroading, the solid plain brass journal bearing has served to keep trains rolling. Principal advantages of this type of bearing are its simplicity of design; its ease of installation, service, and replacement; and its low cost.

However, friction develops heat, and in normal operation the friction bearing will naturally run warm. Therefore, lubrication is used. The problem arises when there is lubrication breakdown – when the bearing runs *too warm*. This is commonly known as a *hot box*, a condition all railroadmen are familiar with.

And it is here that the questions begin.

Q – How hot is a hot box?

A – Statistics show that a normal bearing, under equilibrium conditions, will run 30°F above or below the mean operating temperature of all journals on the train. Therefore, a bearing whose running temperature is markedly above this range must be considered abnormal – and consequently be defined as a "hot box."

Q – Do all friction bearings run within this temperature range?

A – Not all. There are certain exceptions. Notably, in the case of new bearing brass which is not yet "worn in" to seat properly. However, its operating temperature will fall within the normal range in a short running period.

Q – Do hot box detectors measure bearing temperature?

A – No, and they do not have to. In the development of the SERVOSAFE® Hot Box Detective* system, for instance, engineers investigated this approach, as well as a number of others. Measurement of specific bearing temperature was ruled out – both as impractical and unnecessary.

Q – If actual bearing temperature is not measured, how can hot boxes be detected?

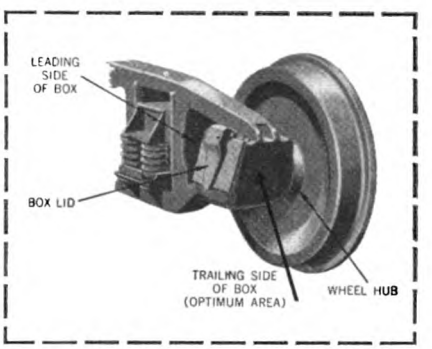
A – Refer again to the initial answer. Normal bearings run at a mean or average temperature. What that specific temperature, or heat, may be is unimportant. Key consideration is that a *normal heat standard* is established. By comparing the heat of all bearings to that standard, it is easy for the detector to tag the bearing (or bearings) that runs hotter than normal.

Q – Wouldn't it be better if the system detected specific "temperature"?

A – No, not really. Take the simple illustration of a person with a fever. If 98.6°F is considered normal, and he is running slightly warmer, his doctor knows this is a danger signal. The mere fact that his temperature exceeds the norm alerts the doctor to watch for further complications. The fellow with the fever knows that he is ill – and that he had better take early care to avoid a major illness.

Q – How can you detect bearing heat on a moving train?

A – Through the science of infrared, "the eye that sees heat." It's the same as feeling every passing journal box without touching it. The SERVOSAFE Hot Box Detective system "sees" or "feels" the trailing surface of every box. The back of the box, as pointed out in the accompanying illustrations, gives a proportioned reading closer to actual bearing temperature than any other spot.



TRAILING SURFACE SHOWS HOT BOX BEST

Tests conducted by a major Eastern railroad prove that the trailing surface of the journal box presents the optimum accessible area for hot box inspection. Presenting a low-mass path of thermal flux from the bearing, this spot responds most rapidly to bearing temperature changes. The SERVOSAFE® "slant-aspect viewing" method of scanning this optimum area is protected by Servo patents both in the U. S. and abroad. Hot boxes – as well as developing hot boxes – can best be detected the SERVOSAFE way.

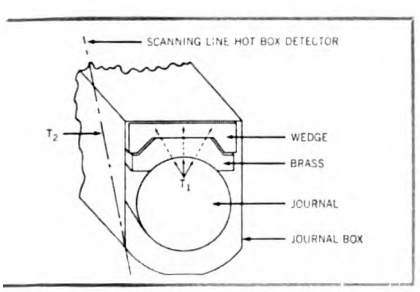
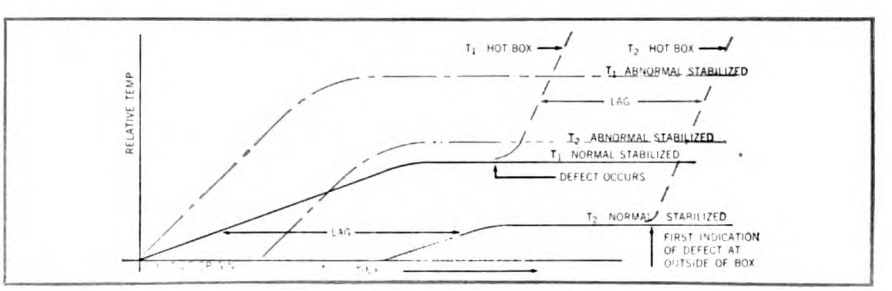


Illustration of typical bearing assembly shows how SERVOSAFE® Hot Box Detective* scans the trailing surface of journal box on passing train. T_1 = temperature of journal-bearing interface. T_2 = temperature of trailing surface of journal box.



Temperature on the scanned surface of the journal box (T_2) is proportional to temperature at the actual journal-bearing interface (T_1). For all practical purposes, then, SERVOSAFE® Hot Box Detective* sees the actual heat condition of each bearing. Once normal operating temperature for all bearings is established, the infrared detector can quickly spot all dangerously overheated, abnormal bearings, or *hot boxes*.

Protected under one or more of the following U. S. Patent Nos.: 2,880,309, 2,947,857 and 2,963,575. Other U. S. and foreign patents pending.

NYC Has Production-Line Cleaning

(Continued from page 30)

Machine 2 holds a mixture of equal parts of a petroleum solvent and Magnusol, a non-corrosive, non-toxic chemical for removing grease, dirt and oil from parts. Machine 3 contains equal portions of Magnus 755 and petroleum solvent. Machine 4 holds only petroleum solvent. Machine 5 contains No. 10 lube oil.

Tailoring cleaning operations to individual part requirements is demonstrated by the cleaning of sintered bronze fuel oil filters. This process is a "Code 1-2" operation. The filters are first loaded in Machine 1 containing the 4-1 mixture of Magnus 755 and water. Agitation in this mixture for a short period serves to flush contaminants which could not be reached by conventional soak, spray, or brushing methods.

After the prescribed cleaning cycle, filters are removed from Machine 1 and agitated in Machine 2, rinsing in the petroleum solvent and Magnusol. They are then blown with steam in a specially designed holder and are again ready for use in an engine.

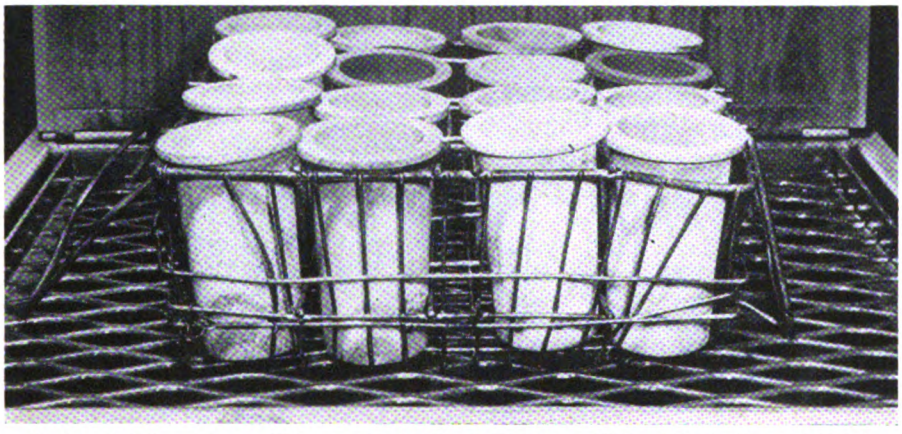
Lube oil suction strainers "Code 3-2" are automatically agitated and chemically cleaned in Machine 3 and rinsed in Machine 2. Cuno filters also carry a "Code 3-2" and receive the same cleaning sequence as the suction strainers.

Air compressor filters, on the other hand, are coded "4-5," indicating that they be first machine cleaned in the petroleum solvent of Machine 4, then dipped in the lube oil in Machine 5.

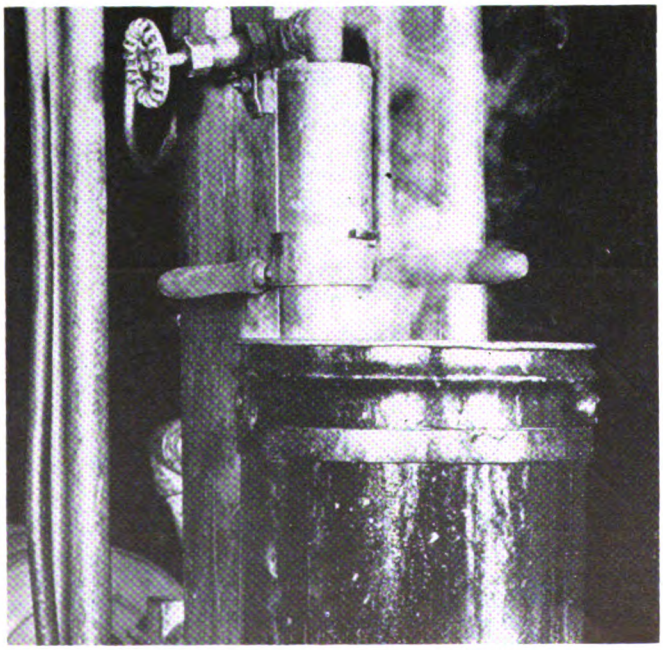
All machines are identical in control and action, providing automatic cleaning during cycles and freeing the mechanic for continued duties in other phases of the cleaning service. Loading the platform of the machine and a touch of the control lever is all that is necessary for the cleaning operation.

Before adopting the production-line method, each railroad mechanic removed parts requiring cleaning and carried them to the rear of the shop, interrupting the servicing of the locomotive. In that area were several cold tanks, a lye vat, and a live-steam gun. Two men worked on these parts by hand, brushing and scraping each piece. Shop operations were often delayed while mechanics waited to replace parts.

Since production-line cleaning was installed, an average of 30 diesel locomotives are being serviced in every 24-hr (3-shift) period. No brushing or scraping of filters or strainers is necessary, and the men previously used for hand labor have been freed for duties in other parts of the shop. No one waits for parts to be cleaned. Mechanics move only a few steps to place work in the machines, to transfer parts from one machine to another, or to remove them after the final cleaning operation. Servicing has been made easier, faster, and more effective—at substantial cost savings.



Basket of sintered bronze filters is removed from Magnus machine. Filters will be steamed.



Filter is clamped in steaming device to be blown with live steam after it completes the cleaning cycle in Miji-Lifs.



Ready for return to service, this sintered bronze filter is checked after removal from the steam cleaning device.

Developing Traction-Motor Insulation

Materials must be chosen and applied so the resulting system is effective and economical

Traction service subjects insulating materials and systems to many different stresses. While electrical requirements are modest, mechanical and thermal stresses are severe. Part 1, published last month, classified the stresses to which insulations are exposed. Here in Part 2, the design of complete systems is discussed, indicating how balance is achieved.

Temperature presents the greatest obstacle to obtaining an insulation system which retains its waterproofness in service. Differential thermal expansion of metal and insulations tends to produce relative motion. Resins used for waterproofing are subject to thermal deterioration.

A resin-solidified armature will continue to run even if cracks have developed. In fact, an armature with a straight-through crack — although it will lose its insulation resistance immediately upon being immersed in water—will promptly recover after it is removed from a brief immersion. This characteristic may prove important in service. However, cracks in insulation systems are generally not desirable.

Epoxy resin produces a strong bond to most solid materials, with two exceptions: Teflon and silicone. Effective bond strength is limited by the strength of the material to which the epoxy bonds. Epoxy bonds well to copper and to copper oxide, but the bond strength between the oxide and the copper is poor. The epoxy does not prevent the oxygen in the air from oxidizing the surface of the copper at high temperatures. The resultant effective bond strength of such a system is very low. At lower operating temperatures, less oxidation takes place and the bond strength remains high.

While the thermal conductivity of insulation systems is improved by resin solidification, the overall effect is not very great if the insulation is well compacted at the start. If important heat paths have high conductivity, as is the case in a tight-fitting slot, little improvement is to be gained by resin solidification.

Practically all heat leaves a machine by passing into the air. One barrier to heat flow is the thermal resistance of the insulation structure, including voids. Another is the thermal resistance between the exposed surfaces and the air stream. Since the former is the smaller of the two, any changes made in it will have relatively little effect upon the total resistance. The effect on the total resistance would, of course, be more noticeable if the insulation were not tightly compacted before resin solidification.

Tests on armatures produced the following results:

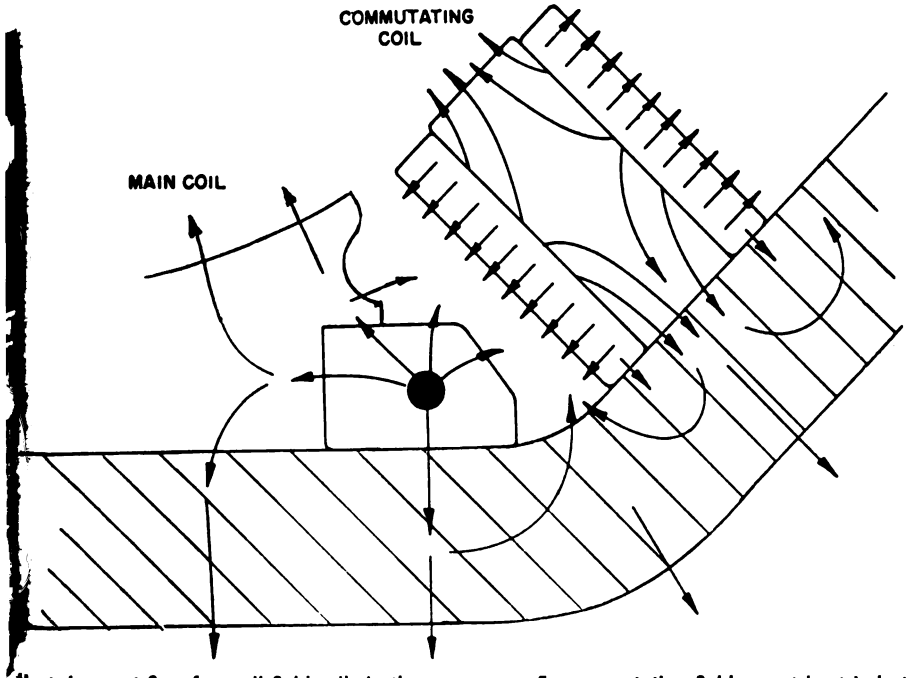
- Temperature rise for a resin-solidified armature is only about 10% less than for one treated by hot dipping in conventional varnish.
- Temperature rise measured by resistance was substantially higher for an armature having glass bands than for one having a glass band at the commutator end and a steel band at the pinion end.
- Glass bands half the original thickness reduced the temperature rise to normal.

Conditions at the two ends of the armature differ. The use of a steel band at the hot pinion end will help dissipate heat from this critical area and increase winding life. Thermal conductivity is not as important on the commutator end. Here, glass is preferable because it can withstand flashover that would cause the loss of a steel band.

Field coils do not receive as much mechanical punishment as armatures because no rotation is involved. Thermal problems are less severe because of greater thermal capacity. The thermal expansion problem is a less potent factor because the solidified coil can expand relative to the pole without producing cracks in the insulation system. The thermal conductivity problem in field coils is based on the same principles as in armatures. Heat can escape by passing from the copper through the insulation to the air, or from the copper through the insulation into the iron and then to the air. In a four-pole traction motor, the first path is more important for commutating fields and the second for exciting fields. Hence, the sides of the commutating coil should have high thermal

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Second of two installments based on a paper presented before an AIEE Land Transportation Committee meeting by J. K. Wentz and R. M. Lukes of the Locomotive and Car Equipment Dept., General Electric Co.



Heat does not flow from all field coils in the same way. For commutating fields, most heat is lost to the air. For exciting fields, most heat is dissipated by passing into the frame.

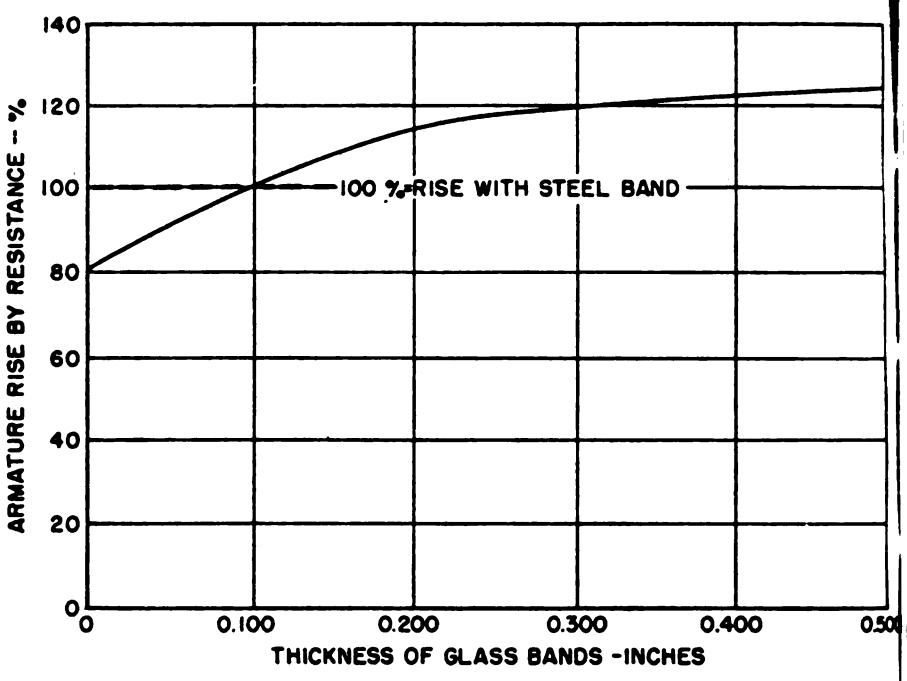
conductivity. Conversely, the exciting coil should have intimate contact with the frame and, therefore, should be designed with enough solid insulation to fill the space between the pole tip and frame.

Arrangement of the coil turns is another factor. In the exciting coil, any heat escaping horizontally must pass through several layers of turn insulation. Each turn of the commutating coil contacts the insulation next to the air stream. Therefore, this insulation must have high thermal conductivity, be thin, and adhere closely to the copper. The air space formed if it breaks away interferes with heat flow. Coils designed with no insulation on the outer edges of the center turns show minimum temperature rise.

Resin Solidification

Resin solidification has been applied to armatures as a means of extending their useful life. Periodic revarnishing of armature has been common practice for many years. It prolongs life, seals cracks and provides smooth dirt—and—water-repellant creepage surfaces. Naturally, revarnishing or resin solidification must be preceded by thorough cleaning.

The vacuum-pressure method is very effective for impregnating. The resin penetrates small crevices and and pores of the insulations. Epoxy or other solventless resins fill the voids, although some are bound to reappear because of drainage during baking. There are limitations to this procedure. Worn mica cannot be replaced by revarnishing. In some old armatures, abrasion resulting from torsional vibration, road shock, shaft bending, and core deflection has actually worn out the mica. If an armature is on the verge of failure, any kind of varnish impregnation will be of doubtful benefit. Mechanical soundness in modern traction motor armatures is not derived from varnish. Core tightness is achieved by heavy shrink fits, heavy punchings, commutator nuts. and other mechanical devices. Solidly compacting the mica and glass into intimate contact with the iron and copper produces sound windings. Often these new armature features can be applied to old armatures when rewinding. In the case of old armatures with loose cores and windings, it is likely that vacuum impregnation would serve to tighten both the core and coils.

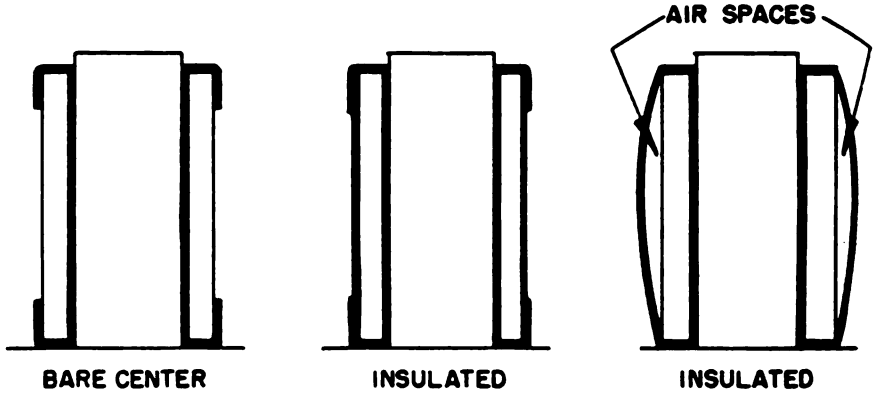


Computer analysis shows the relation of armature temperature rise to thickness of glass banding. Basis of comparison is temperature produced under equivalent steel bands.

Every engineer strives to achieve balanced designs. For insulation this would be a design which takes into account the electrical, mechanical and thermal factors, as well as the maintenance practices to which the machine will be subject. A balanced insulation system uses the best available materials. Each material has certain characteristics that make it suitable to serve a particular function, but which, at the same time, make it unsuitable for another function. The insulation designer must be familiar with the properties of materials as well as with the service each is to perform.

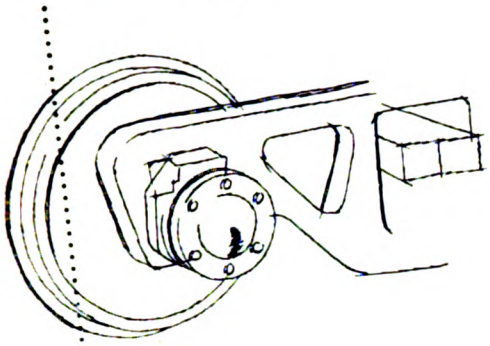
Teflon is unaffected by thermal degradation up to about 350 C, yet it is unsatisfactory for most traction-motor insulation applications because of its poor mechanical strength. It does, however, find very effective use as a replacement for porcelain insulators in brush holders. Here, its poor mechanical strength is no handicap, and its excellent arc resistance is very useful.

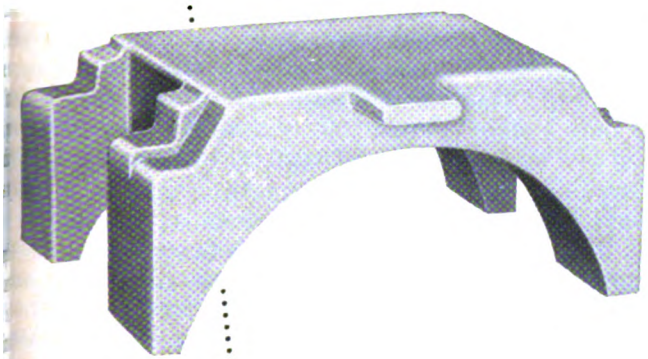
Silicone is another example. It is more stable thermally than any of the polyesters or epoxies and is, therefore, used to advantage on insulations which are close to the copper in traction-motor armatures. On the other hand, the poor oil and solvent resistance of silicone prohibts its use on outer surfaces. Balance is achieved by using polyesters or epoxies in such locations.



Coil insulation can interfere with heat flow if it breaks away from copper. Bare center turns show minimum temperature rise; proper overall insulation can dissipate heat.

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all freight car truck
roller bearings





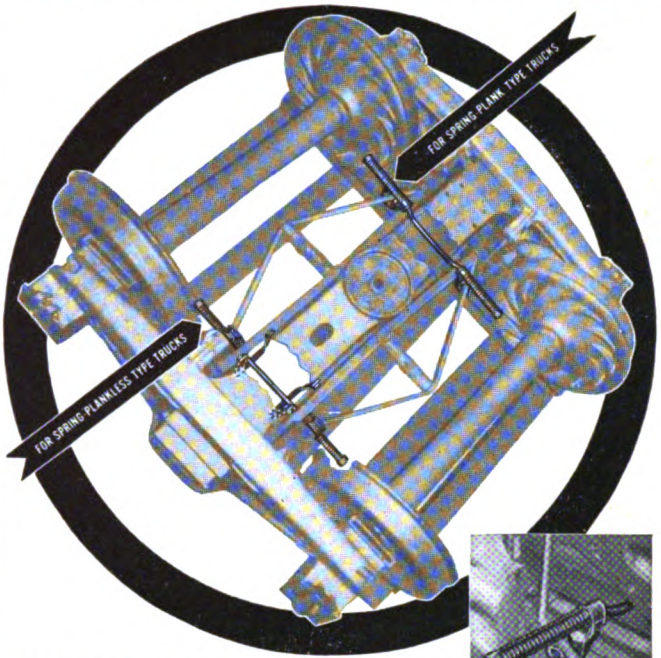
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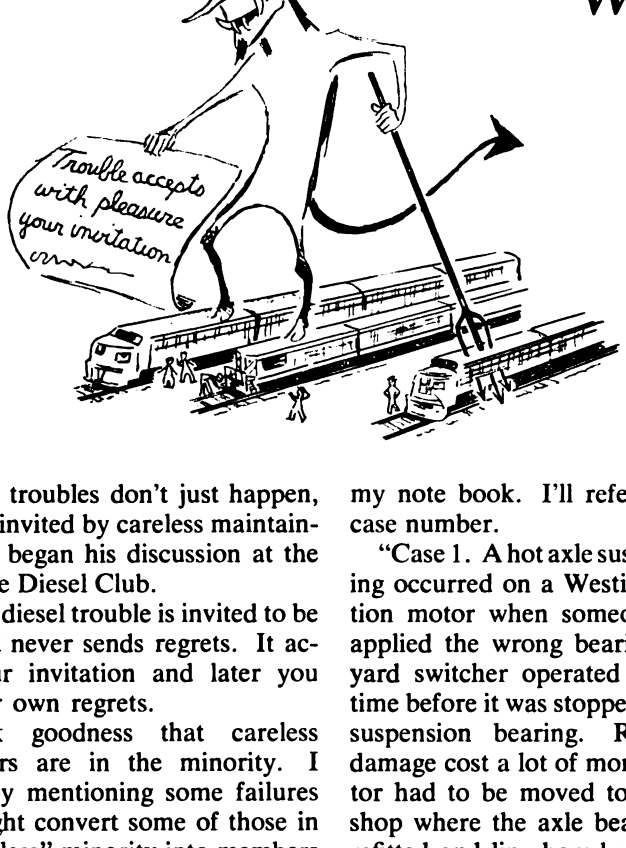


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When Invited Guests Aren't Welcome

By Gordon Taylor

"Diesel troubles don't just happen, many are invited by careless maintainers," Doc began his discussion at the Centerville Diesel Club.

"When diesel trouble is invited to be a guest, it never sends regrets. It accepts your invitation and later you have your own regrets.

"Thank goodness that careless maintainers are in the minority. I thought by mentioning some failures that I might convert some of those in the "care-less" minority into members of the "care-more" majority. The reward will be the satisfaction that goes with a job well done."

Tom Adams, a visitor from a neighboring railroad, spoke up. "Doc, I think a lot of today's failures are due to the fact that all our diesels are getting older; what's your thought on that?"

"I agree with you to a limited degree," answered Doc, "but maintainers are also getting older and have a great deal more experience than they had when these units were new. Maintainers should be better able to head off trouble, but I find we are having too many failures chargeable only to carelessness."

Tom asked Doc if he would cite some cases of careless maintenance that caused locomotive delays and failures.

"I had anticipated just such a request," Doc responded. "I have a number of such cases jotted down in my note book. I'll refer to them by case number.

"Case 1. A hot axle suspension bearing occurred on a Westinghouse traction motor when someone carelessly applied the wrong bearing cap. The yard switcher operated only a short time before it was stopped with the hot suspension bearing. Repairing the damage cost a lot of money. The motor had to be moved to the machine shop where the axle bearing cap was refitted and line bored so the bearing would fit the axle perfectly.

"Axle bearing caps are individually fitted to each traction motor and line bored. The caps, stenciled with a number to match the motor number should be kept securely bolted to the motor and should be shipped with it at all times.

"Case 2. An Alco road-switcher drifted into a transfer-table pit. The hand brake had been released for the application of brake shoes, but the wheels had not been blocked. When the maintainer left the unit for a short interval, it rolled into the pit. Units with roller bearing journals, cannot be trusted to remain standing with the brakes off," Doc concluded.

"Case 3 involved a hot journal bearing on a road freight unit which occurred when an oil drain plug was lost from a Hyatt roller bearing journal box. Someone failed to secure it with a tie wire to the filler plug. For want of a tie wire, a journal bearing was ruined by overheating and the axle was damaged. It was necessary to take the unit out of service far from home and to ship a spare truck from the ma shop for an exchange of trucks. Th needless and expensive delay and r pair job could have easily been avoi ed if a maintainer had applied a bit locking wire to the drain plug.

"Case 4. An exhaust manifo overheated on an Alco engine when maintainer failed to replace an inspe tion cover on the air manifold aft making a 'blow by' test. As a resu of insufficient air for proper fuel cor bustion, there was an engine failu and a damaged exhaust manifold.

"Case 5. An Alco road unit, part a three-unit locomotive, arrived at division point with the crew reporti that the engine had been shutling dov because of what they thought was lo lube oil pressure. Local maintaine thought governor trouble was causi the engine to shut down. That w good thinking as far as it went. T maintainer knew that the govern used high pressure oil, supplied by t governor oil pump, to operate the e gine fuel racks. Low pressure mea governor action will be weak, unab to hold engine speed steady. If pre sure is too low, the engine won't r at all. They found nothing wrong e cept the oil supply seemed a little lo in the governor oil tank. After addi a little oil the engine ran properly a the unit was allowed to continue i its run.

"However, the unit gave more tro ble before it reached the next divisi point. A diesel supervisor quickly l cated and corrected the trouble. It w governor trouble, but not a lack governor oil. The control cable th plugs into a receptacle on the governo was not securely fastened. A few tur of the locking ring on the cable plu tightened the plug and the trouble w corrected. With a good electrical co

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

ction to the locomotive control system, the governor could once more keep the engine speed steady.

"Just to emphasize the importance of proper plug-in connections, let me tell you of another case of this type. A four-unit Alco locomotive was leaving a large terminal when the engine on the lead unit suddenly stopped. The enginemen made a quick inspection, but were unable to locate the trouble. A call was made to the diesel shop for an electrician. He quickly discovered a poor connection where the plug fits into the receptacle on the fuel pump motor. This plug is also one that depends on a locking ring. Although we received a report that vibration caused the ring to loosen, it is my belief that if the locking ring had been properly tightened we would never have had a 30-min. delay.

"These two cases emphasize the importance of carefuly making and checking all electrical connections. Even when a connection is made through a plug and receptacle, you cannot afford to be careless. The condition of receptacles should be checked by flashlight inspection and plugs should be carefully secured. There is no substitute for care in diesel maintenance and this applies to plug and cable connections just as it does to all other locomotive components."

"Case 6," Doc continued, "involved a diesel freight unit which had been reported as having trouble. A maintainer was instructed to see if he could locate the trouble and make repairs. While making his inspection, he removed the arc chute from a power contractor. He failed to find any trouble there, but did find some wiring trouble in another part of the unit which he quickly repaired.

"The maintainer failed to replace the arc chute over the contactor, leaving it on the floor of the unit. A cleaner working through the locomotive discovered the arc chute. Not knowing what it was, he carried it to the foreman's office the first time he went that way. By the time the foreman received the arc chute, the unit had been dispatched. When this was discovered, the locomotive crew was notified to isolate the unit until an arc chute could be installed on it." Considerable damage can result when an arc chute is missing. It is important to see that arc chutes are replaced and properly secured.

"While we're talking about arc chutes, let's give you another example of careless handling. A two-unit EMD passenger locomotive was dispatched from its home terminal. It had gone only a short distance when one of the engines on one unit experienced a ground relay action. The ground relay was reset and very quickly operated again. When a third ground relay action occurred, the crew isolated that engine and wired that they were proceeding with one engine not working.

"An experienced road foreman boarded the locomotive at the next terminal and quickly found that the arc shield on the shunt field contactor was not closed tightly. After closing it and putting the engine back on the line, no further trouble was experienced. A very small hole was burned in the 'blow-out' coil shield. This was temporarily repaired at the first major terminal and replaced with a good shield when the unit returned to its home maintenance point.

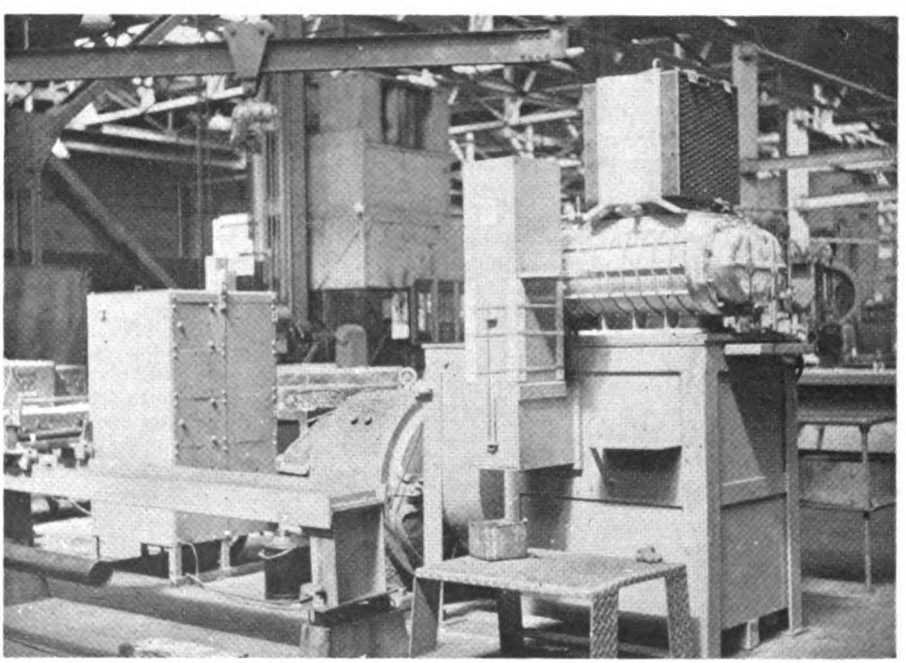
"The real cause of trouble in this case was carelessness on the part of the man who had failed to place it in its proper position originally. The unconfined arc had a chance to establish a temporary ground path which each time operated the ground protective relay. The tripped relay would de-energize the ER relay and the shunt and battery field contactor operating coils. Engine speed would drop to idle, or the engine would stop if the relay operated when the throttle was in the 5th or 6th position.

"Case 7 involved a three-unit freight locomotive which arrived in a terminal with one engine shut down because it had overheated when the radiator shutters failed to open. Tonnage had been reduced to the two-unit rating, causing considerable delay. What do you think was wrong?

"The air supply valve for the shutter cylinder was closed. The engine overheated only because someone 'goofed.' The engine crew should have been able to determine if there was air for shutter operation.

"Several times the summer-winter switches have been found in the 'winter' position recently," Doc said. "Careless handling of this switch invited diesel engine trouble and diesel troubles always go where they are invited.

"I believe," Doc concluded, "that I have cited enough cases to establish that we are not doing our best when there are failures such as these. The lessons we learn from experience are costly, but they can be made to pay off, if we put what we learn into practice. To take the 'DIE' out of 'diesel,' we must exchange 'care less' for 'care more.' "



Reconditioned engine blowers are tested on this device at the Paducah, Ky., shop of the Illinois Central. A plate jig on the exhaust compartment takes either the right- or left-hand blower. The compartment is completely lined with sound-deadening material. The stack is fitted with a sliding damper to restrict the exhaust and load the blower. Oil is pumped through the blower bearings by a ¼-hp motor. A 50-hp, variable-speed motor drives the blower through a V-belt and pulley arrangement. Two-speed motor control makes it possible to operate the blower at 1,200 rpm and at 2,340 rpm which coincides with the diesel engine speed in eighth throttle position. Each blower is tested for 30 min.

Report

(Continued from page 6)

shipments on open-top cars not covered by a specific figure in Sections 2 to 6, inclusive, also for shipments of any commodity loaded on well-hole or depressed-floor cars.

"The originating carrier and shipper must confer as to appropriate blocking and bracing methods for loads not covered by a specific figure. Consideration must be given to topography, distance traveled, multiple track, grades, curves, and train speeds . . . from origin to destination. When differences between carriers cannot be resolved, the chairman of the Committee on Loading Rules shall appoint three neutral committee members, preferably from the region in which the controversial shipments originate, to make a decision. Full authority is given to render an immediate decision after an on-the-ground investigation at the originating point."

If the group decides the securement should be strengthened, the originating carrier must comply and notify all participating carriers of the decision. If any carrier considers additional securement necessary, changes can be made at its own expense when the shipment reaches its line.

After a study of the humping of quadruple shipments, the committee has decided that, under no circumstances, should any shipment on four cars be humped. A Mechanical Division directive will be issued instead of incorporating this ruling in the Manual. Humping of twin and triple shipments is to remain the responsibility of individual carriers.

Rules governing the loading and securement of lading on open-top trailers in piggyback service on which the Committee is working are initially to be published as recommended practice instead of being mandatory. The TOFC loading rules will be issued as a separate book, similar to the TOFC interchange code recently issued by the Mechanical Division.

The Committee reports that, because some foreign high-tension steel bands do not meet AAR physical requirements, shippers and carriers should use care in purchasing banding material. Manual revisions including new, recognized standard gages of bands are being considered.

Continued shipper requests to minimize load securement on cars in order to cut costs are of concern to the Committee on Loading Rules. While everyone is cost cor- ous, the Committee emphasizes that th are certain limitations which must be served, and safety always takes precede

Continuing the Division's efforts to all types of car and lading damage, the p formance of 11 draft gears which have be involved in 818 test impacts at the A Research Center is still under study. T Committee on Couplers and Draft Gear initially being provided with a summ showing the impact forces developed these gears at various speeds (RL&C, M 1961, p 21). Additional reports, still un preparation by the Center, will compare reaction forces developed by these d gears during drop-hammer tests with th developed during actual impacts; will vestigate the forces and stress distribu in car structures under impact conditi and will correlate impact reaction fo with lading damage.

Journal Lubricators

"Approved for Test" status is currer granted to 27 journal lubricating device the AAR Mechanical Division. Latest ing, issued in June, also shows 12 w "Conditionally Approved" status. The p

New Problems in Car Interchange

This is the twenty-seventh installment of a series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs To, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirements of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the Rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, come from a background of intimate association with the application of the rules.

What important steps have recently been taken by the AAR Arbitration Committee to make possible use of machine billing for car repair work by roads desiring to use this method? (288)

The AAR Arbitration Committee included in its 1961 Annual Report recommendations covering basic changes in Rules 7, 8, 93, and 96 as well as in the billing forms which will make this new method possible on and after January 1, 1962. These basic changes are now the subject of a letter ballot.

Do these recommendations involve all of the rule changes which will be necessary to make possible the use of this new method? (289)

No. These recommendations cover only the basic rule changes which will be involved. The interested Committees are now working on a number of related changes which are intended as part of this proposition for inclusion in its entirety in the 1962 Interchange Code.

What is the general nature of the additional rule changes on which the interested committees are now working? (290)

In general, they represent further simplification of many of the individual rules as well as the establishment of a large group of additional so-called "net, applied" items. A comprehensive field study has been made by the Special Task Force which has proved the logic of combining many more pricing items where the differences amount to only a small percentage of the cost of the individual repair transactions involved.

What divisions of the AAR are collaborating in this work? (291)

The Mechanical Division and the Accounting Division.

Is information now available as to the new and revised billing forms which will be involved on and after January 1, 1962, so that advance consideration can be given as to the selection and printing of those forms which each individual railroad intends to use after the first of next year? (292)

The revised forms, as well as the new forms which are intended, are shown on pages 57-65 of the 1961 Annual Report of the Arbitration Committee.

Does this package proposition intend that each company in the future shall have a free choice in selecting machine or manual billing for car repair work? (293)

Each road shall have a free choice, but no company shall have the right to reject repair bills rendered under the machine billing method if such method complies with all of the requirem of the revised rules as proposed.

Which roads are likely to be the firs adopt the new machine method of b ing? (294)

It is claimed by the experts that, if propriate machines are already insta for similar work, the additional car pair billing can be handled with m less expense and faster than by exis methods. It would seem logical, th fore, that such roads might be the to look into this matter.

What other benefits will be reali from all of these changes when they completed by the AAR Arbitration Price Committee for inclusion in 1962 Code? (295)

Simplification and changes will rec the work of those in the field who p pare repair cards as well as the work those employed in billing offices. M ual billing will also be simplified so what.

What is the purpose of the preprint data on the revised form covering ori nal record of repairs; and on the n billing repair card form? (296)

To simplify, as well as speed up, work of preparing these forms w repairs are made to foreign cars.

Is it the duty of the "party certifying pairs" to check all repair work p formed to see that it agrees with the information which is recorded on the pair card before signing this for (297)

Yes. He is the party who will be h responsible for the correctness of repair card as rendered.

ent status of all journal lubricators is shown n the following table:

	Conditionally Approved
Absco Journal Lubricator	Yes
Accurate Journal Lubricator	No
Almco Lubricating Pad	No
Atlas Journal Lubricator	No
Centra-Feed Journal Lubricator	No
Crown Journal Lubricator	No
Easy-Flo Journal Lubricator	Yes
Economy Lubricator Pad	No
Flo-pak Journal Lubricator	No
G-B Lubricator Pad	No
Hennessey Mechanical Journal Lubricator	No
Hennessey Lubricator Lube-Pad	Yes
Journapak Journal Lubricator	Yes
Lar-pak Journal Lubricator	No
Landreth-Pak Lubricator	No
Oilrite Journal Lubricator Pad	No
Optimum Journal Lubricator	Yes
Premier Journal Lubricator	Yes
Polin Journal Lubricator	Yes
Royal Journal Lubricator	No
Rockell Reversible Lubricator	No
Southland Journal Lubricating Pad	Yes
Spring-pak Journal Lubricator	Yes
Truk-Pak Journal Lubricator	No
Uni-Pak Journal Lubricator	Yes
Utility Journal Lubricator Pad	Yes
Vikit Journal Lubricator	Yes

WANTED

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ICC Seeks Inspectors

Examinations to fill positions of inspectors of locomotives with the Interstate Commerce Commission have just been announced by the U. S. Civil Service Commission. Vacancies exist at cities throughout the country. Applicants are required to have six years of pertinent experience with common carrier railroads; completion of a 4-yr college course or a railroad special apprentice course can be considered as part of the required experience. Applications for the positions, which carry a starting annual salary of $8,955, must be filed with the ICC Civil Service examiners by September 5, 1961.

Personal Mention

American Refrigerator Transit Co.—*St. Louis, Mo.:* W. ARTHUR POPE appointed mechanical superintendent, succeeding RAYMOND G. SETZEKORN, retired.

Canadian Pacific.—*Winnipeg:* J. J. RABY appointed superintendent motive power and rolling stock, Prairie region, succeeding T. F. DONALD, retired.

Frisco.—*Springfield, Mo.:* E. R. TYLER appointed general diesel and air-brake supervisor, succeeding A. M. MALMGREN, retired.

Gulf, Mobile & Ohio.—*Bloomington, Ill.:* H. R. KINNEY appointed general master mechanic.

Milwaukee.—*Deer Lodge, Mont.:* Duties of J. H. KERVIN, master mechanic, expanded to include jurisdiction over all car department activities in Mobridge, S.D.—Avery, Ida. territory.

New York Central.—*New York:* GEORGE C. CHURCHER, supervisor of training — mechanical, retired. Duties of that position being handled by E. L. HYATT, supervisor of safety and training—mechanical.

Northern Pacific.—*Livingston, Mont.:* R. W. SPANNRING, appointed system diesel supervisor, succeeding W. W. SIMPSON, retired. Mr. Spannring formerly assistant mechanical supervisor at St. Paul, Minn.

Pennsylvania.—*Philadelphia, Pa.:* CLAIR I. CLUGH, assistant chief mechanical officer, retired.

Santa Fe.—*Argentine, Kan.:* J. F. KANIVE appointed master mechanic, Kansas City and Eastern divisions, succeeding H. N. CHASTAIN, promoted.

Southern. —*Memphis, Tenn.:* CLARENCE A. FRICK appointed master mechanic. *Columbia, S. C.:* JACKSON B. YONGE appointed master mechanic.

Southern Pacific:—*Sacramento, Cal.:* JOE PALUMBO appointed schedule foreman, general shops. *Roseville, Cal.*: WILLIAM T. SMALL appointed general foreman.

Wabash.—*Decatur, Ill.:* J. R. BALDWIN, assistant engineer, appointed mechanical engineer, succeeding R. N. FOSTER, retired.

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PRODUCES RESULTS SUCH AS THESE

NEW HAVEN RAILROAD REPORTS

The Magnus cleaning system has cut parts cleaning time by 60% and released 4 men for other, more profitable duties in other sections of the shop.

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The use of Magnus RC-10 Clear Coating — in place of repainting — to rejuvenate and protect old paint has slashed costs and down-time, saving $80.00 to $600.00 per job!

WANT PROOF?

Your Magnus Man can show documented proof of the savings which Magnus Methods have produced for other railroads — can recommend Magnus Methods to save you time and money, too.

magnus
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77 South Avenue, Garwood, N. J.

Please have Magnus Man call.

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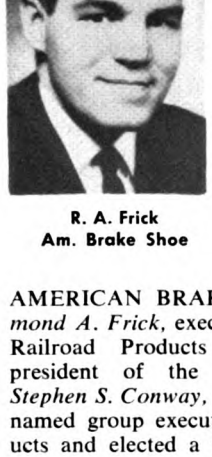
Company _____

Position _____

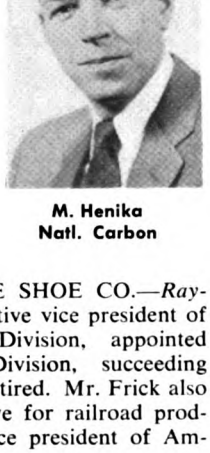
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Supply Trade Notes



R. A. Frick
Am. Brake Shoe



M. Henika
Natl. Carbon

AMERICAN BRAKE SHOE CO.—*Raymond A. Frick*, executive vice president of Railroad Products Division, appointed president of the Division, succeeding *Stephen S. Conway*, retired. Mr. Frick also named group executive for railroad products and elected a vice president of American Brake Shoe.

■

RAILWAY SERVICE & SUPPLY CORP. —*H. P. Kelker* of W. E. Day Co., San Francisco, and *M. W. Wolfe* of Wolfe Equipment Co., St. Louis, named distributors of Utility and Optimum journal lubricators.

■

CARDWELL WESTINGHOUSE CO.; UNIVERSAL RAILWAY DEVICES CO. —*Robert J. Wylie Co.*, 520 Pioneer Building, St. Paul, Minn., appointed resident representative.

■

GENERAL AMERICAN TRANSPORTATION CORP., PARKER-KALON DIV.—*S. S. Kahn*, senior vice-president, appointed president, succeeding *William T. Ylvisaker* who is now executive assistant to the president of General American.

■

BUCK EQUIPMENT CORP. — *A. C. Grant*, general sales manager, named vice-president in charge of sales.

FREIGHTMASTER, DIVISION OF HALLIBURTON CO.—*R. E. Abbott* appointed mechanical engineer.

■

LEWIS BOLT & NUT CO. — *John A. Jones*, Pacific Railway Sales, 55 New Montgomery st., San Francisco 5, Cal., appointed West Coast representative for Sealtite bolts and Loktite nut division.

■

NATIONAL CARBON CO., DIVISION OF UNION CARBIDE CORP.—*Morgan Henika* appointed eastern division sales manager of brush and railroad products at New York. Formerly a sales engineer at Erie, Pa.

YOUNGSTOWN STEEL CAR CORP.—*Edward J. Sherwood*, sales manager, elected vice-president of the sales and a director.

■

HUMBLE OIL & REFINING CO.—*Ed W. Ball*, railroad sales manager, Esso Region, New York, named coordinator of railroad, inland marine, and gas transmission line sales in new headquarters marketing department in Houston, Tex.

■

SYMINGTON WAYNE CORP., SYMINGTON DIV.—*John A. Stueven* appointed sales engineer. Formerly sales engineer Sperry Products Co., Division of How Sound Co.

■

CRUCIBLE STEEL CO. OF AMERICA —*Stephen A. Fronek* appointed product sales manager of silicon steels.

Letter to the Editor

Tubular Hopper

TO THE EDITOR:

We have noted with much interest the article in the June, 1961 issue entitled "Center Flow Car Built of Aluminum." In view of the evident similarity of design of this car to that of the covered aluminum hopper car previously designed by CNR and Alcan engineers, I thought that you would be interested in recalling the article describing the latter car in the October, 1960 issue, page 44, "Tubular Body Reduces Hopper Weight." This car has passed all tests very satisfactorily and the design has now been approved and adopted for service by our Company.

E. T. Hurley
Chief of Technical Research
Canadian National

Helps from Manufacturers

TRACTION MOTOR SUPPORT BEARING. 8-page folder describes new flange lubricated support bearing featuring narrow window bearing to reduce splash loss and extend lubrication period. Discusses details of new bearing conversion plan, including return of scrap brass and purchase and shipment of bearings. (Write: *Electro-Motive Div., General Motors Corp.*, Dept. RLC, LaGrange, Ill.)

BORING MACHINES. 12-page booklet shows in condensed form Ex-Cell-O line of standard precision boring machines—both horizontal and vertical models, hydraulic and cam operated. (Write: *Ex-Cell-O Corp.*, Dept. RLC, 1200 Oakman Blvd., Detroit 32, Mich.)

BLAST MACHINES. 24-page catalog describes line of improved Wheelabrator Super Tumblast, batch-type airless abrasive blast-cleaning machines. (Write: *Wheelabrator Corp.*, Dept. RLC, Mishawaka, Ind.)

SELF-SEALING COUPLINGS. Bulletin No. 629 explains uses of Self-Sealing couplings in fluid piping systems. (Write: *Aeroquip Corp.*, Dept. RLC, Jackson, Mich.)

CONNECTING AND SEALING METHODS. Bulletin WB-1, "How, When and Why to Use a V-Band Coupling," describes simplified connecting and sealing methods. (Write: *Marman Div., Aeroquip Corp.*, Dept. RLC, 11214 Exposition Blvd., Los Angeles, Calif.)

BEARING TERMS. Ball- and roller-bearing parts and terms defined and illustrated in 24-page booklet (Form 343), "Bearing Parts and Nomenclature of Standard and Precision Bearings." (Write: *SKF Industries, Inc.*, Dept. RLC., Front st. and Erie ave., Philadelphia 32, Pa.)

GASKET MATERIALS. 24-page bulletin discusses best available gasketing materials; how to choose right gasketing material, and correct gasket design. (Write: *Garlock Inc.*, Dept. RLC, Palmyra, N. Y.)

METALLIZING. "How to Save Money and Cut Downtime with Metallizing" title of 6-page bulletin cites nine cases where products were salvaged or improved by flame spraying with metals both in wire and powder form (Write: *Metco*, Dept. RLC, Westbury, L. I., N. Y.)

CONSTRUCTIONAL STEELS. 59-page booklet, "New Concepts in Steel Design and Engineering," discusses continuing advances in strength levels, product form and design applications of construction steels. (Write: *Market Development Dept. U. S. Steel Corp.*, Dept. RLC, 525 William Penn Place, Pittsburgh 30, Pa.)

RAILROAD TOOL CATALOG. 16-page tool catalog describes and illustrates special tools designed expressly for those concerned with maintenance of rolling stock, signal systems, track, etc. (Write: *Snap-On Tools Corp.*, Dept. RLC, 8175 28th ave., Kenosha, Wis.)

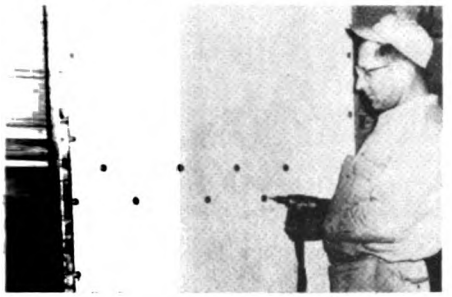
SPRAY EQUIPMENT. Catalog of airless spray equipment lists specifications and information on new medium pump for single gun operation; heavy duty pump for multiple gun operation, and spray guns. (Write: *DeVilbiss Co.*, Dept. RLC, Toledo 1, Ohio)

CHEMICAL PROCESSING COMPOUNDS. 12-page metalfinishing booklet contains specific information for the use of Turco standard line of cleaning and processing compounds for metalworking industry. (Write: *Turco Products, Inc.*, Dept. RLC, 24600 South Main st., Wilmington, Calif.)

AXLE LATHES. 10-page bulletin 3001 describes new Farrel-Sellers dual-end driving journal truing and axle lathes. (Write: *Farrel-Birmingham Co., Consolidated Machine Tool Div.*, Dept. RLC, 565 Blossom Road, Rochester 10, N. Y.)

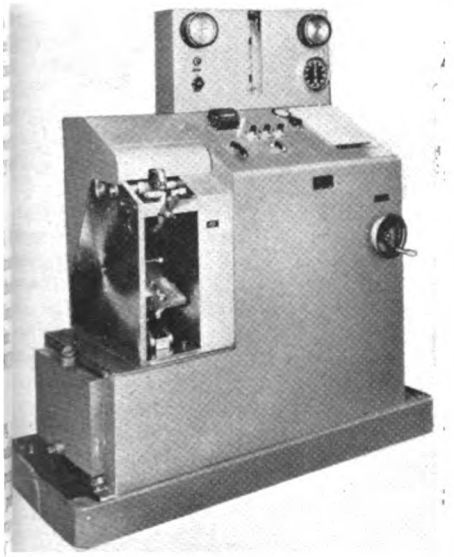
WELDING NEEDS. Bulletin 7000.7, "Weldirectory of Arc Welding Electrodes, Equipment, and Supplies." (Write *Lincoln Electric Co.*, Dept. RLC, Cleveland 17, Ohio.)

(Continued from page 10)



Large Flange Rivet

The large flange "Pop" rivet is particularly suitable for fastening applications involving relatively soft materials, including wood. The rivet, made of aluminum, has a $^{3}/_{16}$-in. diameter mandrel and flange diameter of $^{5}/_{8}$ in. Previously, the largest flange diameter was $^{3}/_{8}$ in. The rivet, according to the manufacturer, has been successfully tested as a primary means of fastening plywood liners to trucks and trailers. *"Pop" Rivets, United Shoe Machinery Corp., Dept. RLC, Shelton, Conn.*

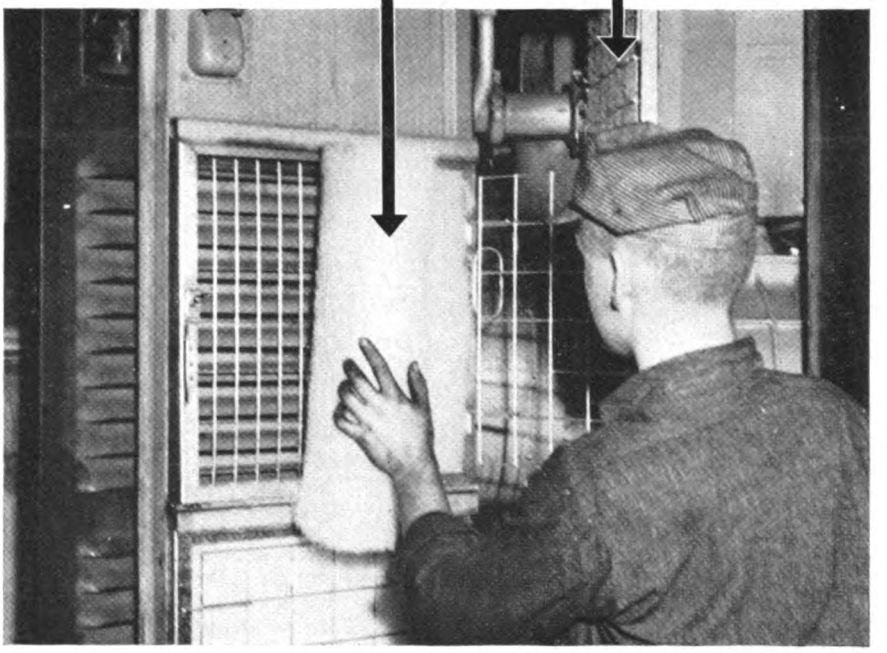


Calibrating Stand

Laboratory accurate fuel injector calibrating of large diesel engine injectors, it is said, can be accomplished at a substantial reduction in time on the Unitest Model U-8500-1A test stand. The stand, developed primarily for General Motors locomotive diesel injector calibrating, permits the checking of fuel discharged over the entire speed range of the engine through the use of a variable speed drive between the motor and the camshaft. An electric tachometer with an accuracy of ½% is one of the instruments which insure accuracy of calibration. Nine Class I railroads are said to be using one or more of the models in their fuel injection shops. *Marine Pumps, Inc., Division of Diesel Control Corp., Dept. RLC, 226 N. Marine Ave., Wilmington, Calif.*

(Continued on page 42)

AAF AMER-kleen air filters do a better job at lower cost on engine intakes and carbodies



REPLACEABLE GLASS FIBER FILTERS PROVE SUPERIORITY IN RAILROAD SERVICE

On-the-job operation in locomotives has clearly demonstrated these three major competitive benefits of AMER-kleen air filters:

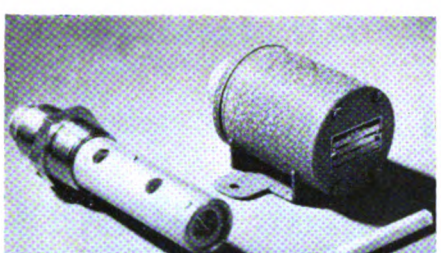
1. *LOWER INITIAL COST.* The cost of AMER-kleen retaining frames is at least 70% less than for metal panel filters.
2. *LOWER FILTER OPERATING COST.* It's far less expensive to replace AMER-kleen glass fiber media at regular intervals than to wash and re-oil metal filters.
3. *LOWER LOCOMOTIVE MAINTENANCE COSTS.* AMER-kleen allows far less dirt (about half that of metal filters) to get to — and into — your equipment.

ONLY AAF MAKES ALL KINDS. AAF makes all three types of filters used in engine intake and carbody service — metal, oil bath and AMER-kleen. We *recommend* AMER-kleen, and we think you'll *demand* AMER-kleen when you know all the facts. Write for a free copy of AMER-kleen Bulletin 125. Address: J. K. Sparrow, Engine & Compressor Department, American Air Filter Company, Inc., 348 Central Avenue, Louisville, Kentucky.

See the Amer-kleen display at the Convention—booth 26

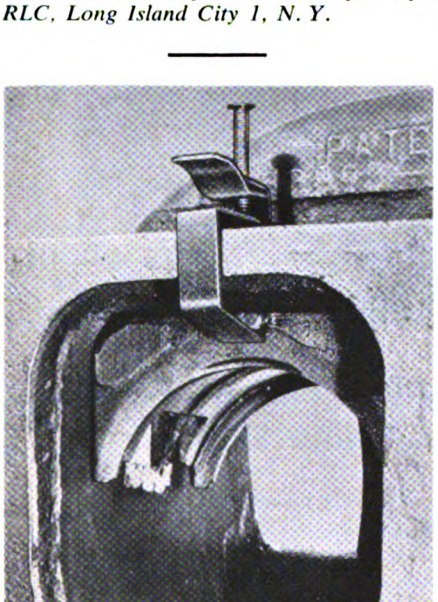
AAF American Air Filter

BETTER AIR IS OUR BUSINESS



Liquid Level Switch

The ultrasonic liquid level switch, employs a dual crystal design. Only a complete liquid path between sensing elements will cause it to respond to the presence of liquid. The switch is a small unit with low power requirements and an accuracy within plus or minus 1/64 in. It may be used on tanks containing any type of liquid, including diesel fuels, serving as high or low level warning and control, flow monitoring, leak detection, etc. The unit, which has no moving parts, may be supplied with separate probe and control unit, or with the two combined. *Liquidometer Corp., Dept. RLC, Long Island City 1, N. Y.*



Bearing Service Tools

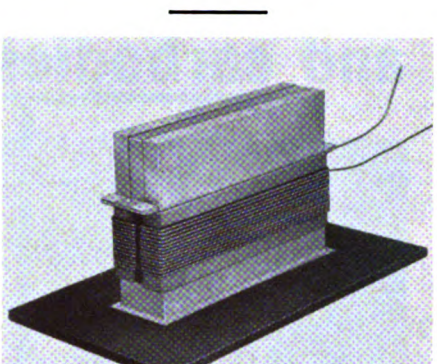
Axle protector sleeve assemblies, integral journal box adapter clips, and pipe plug and grease fitting wrench are three OTC axle journal roller bearing service tools designed in cooperation with the Timken Roller Bearing Co.

The axle protector sleeve assemblies, available for six axle sizes, eliminate upsetting the ends of axles and prevent the wheel bore from rubbing on the bearing seat when wheels are installed on the axles.

The integral journal box adapter clips are designed to hold the frame adapter to the top of the journal box while box is placed on axle assembly.

The pipe plug and grease fitting wrench is said to speed removal of pipe plug in axle end cap and application of the grease fitting during lubrication. One end of the wrench has a 3/8-in. square drive for removing and installing the pipe plug; the other end has a 1/2-in. square drive with a 7/8-in. socket for removing and installing the grease fitting.

The tools have been approved by Timken and Hyatt Bearings Div. of General Motors. *Owatonna Tool Co., Dept. RLC, 680 Cedar st., Owatonna, Minn.*



Sonic Cleaners

A magnetostrictive transducer, metallically bonded to a 1/2-in. thick 316-L stainless-steel diaphragm, is used in the Bendix Omnimite series of sonic cleaners. According to the manufacturer, the transducer diaphragm assembly will not break, crack, deteriorate, or in any way cease to function for the lifetime of the cleaning unit. It is adapted for use in the metal working, pneumatic, hydraulic, and electronic fields. *Bendix Corp., Pioneer-Central Div., Sonic Energy Products, Dept RLC, Davenport, Iowa.*

Disposable Towels

Kimtowels are said to be lint free and to have high-tensile strength and quick absorbency. They have been tested in locomotive shops for wiping bearings, cleaning gears, soaking up oil spillage, and other applications. Saturated with solvent, they may also be used to clean machine tools, or to pick up chips and shavings. The 13-by 15-in. towels are packaged in lots of 50. *Kimberly-Clark Corp., Industrial Products Div., Dept. RLC, Neenah, Wis.*

Reusable Fitting

A tapered steel socket, which is pushed over segements during assembly; two aluminum segments which grip hose reinforcement securely, and a steel threadless nipple, feature the Iron Mike detachable fitting for high-pressure hose assemblies. The fitting is designed for use with Aeroquip 150[illegible] multiple wire braid hose which is suitable for operation in temperatures ranging from —40 deg F to 200 deg F and for use with hydraulic fluids, fuel and lubricating oils, gasoline, and air. Fittings are being produced in ten end fitting styles for 1/4-in. to 2-in. hose sizes. *Aeroquip Corp., Dept RLC, Jackson, Mich.*



Air Impact Wrench

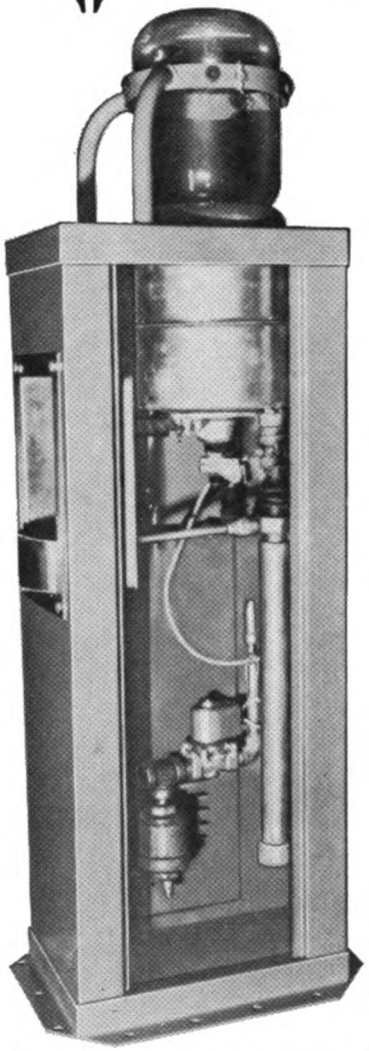
The Thor W-37 air impact wrench has a 3/[illegible]-in. square drive. Elimination of the conventional rotary air motor permits torque output to be controlled directly from trigger to mechanism. Oscillating action keeps hammer and anvil surfaces in a single plane for constant full-area engagement without the need for camming motion to engage and disengage surfaces. The wrench is nominally rated at 3/8-in. bolt size capacity, with 1/2-in. square drive standard and 7/16 in. hexagon ball lock spindle (W-37S) optional. It weighs 5 3/8 lb. *Thor Power Tool Co., Dept. RLC, Aurora, Ill.*

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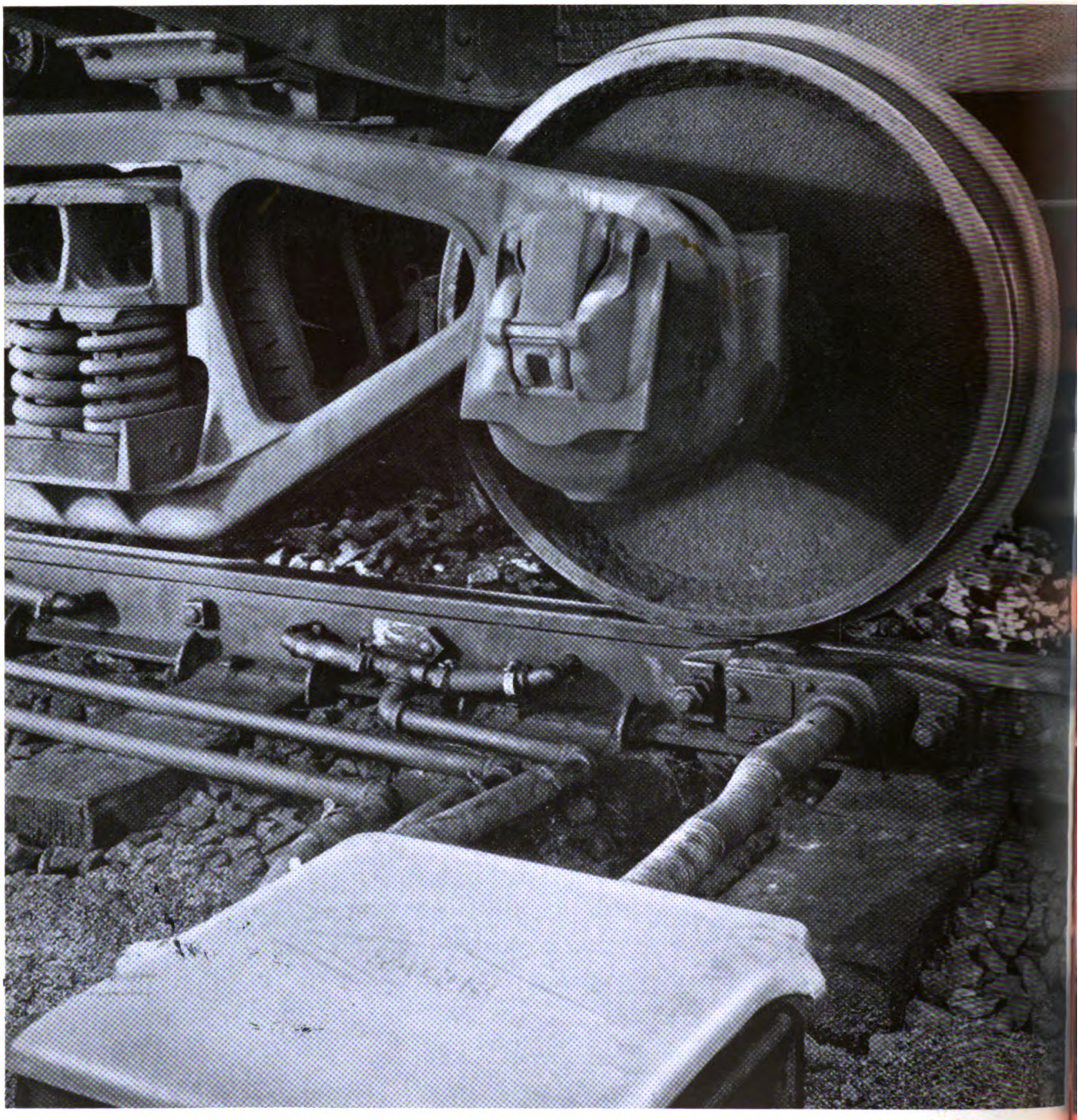
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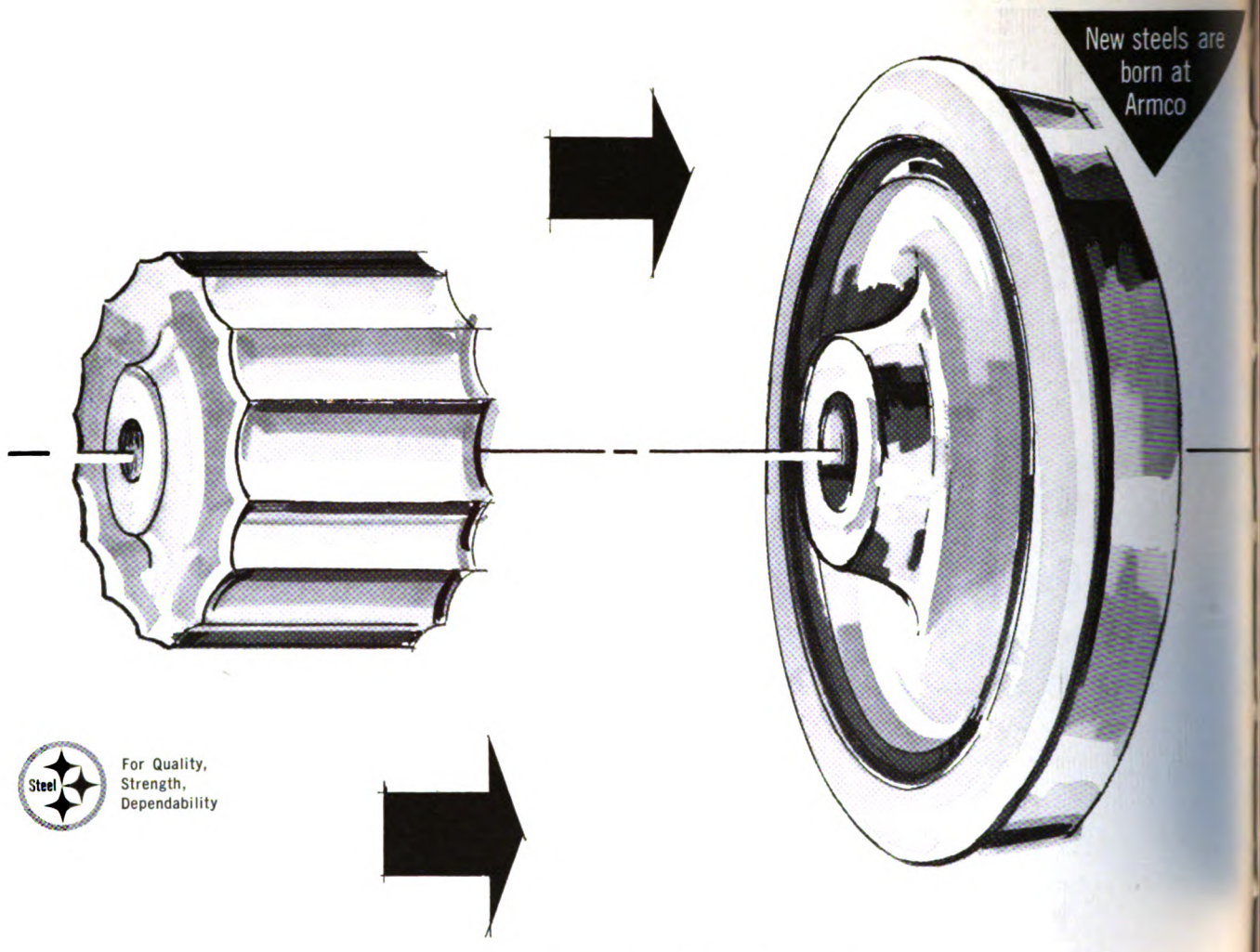
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Southern Acquiring All-Door Box Cars . . . . . page 65



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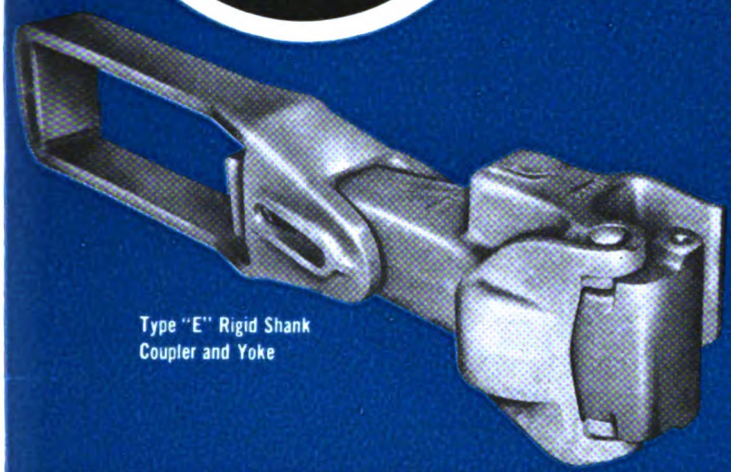
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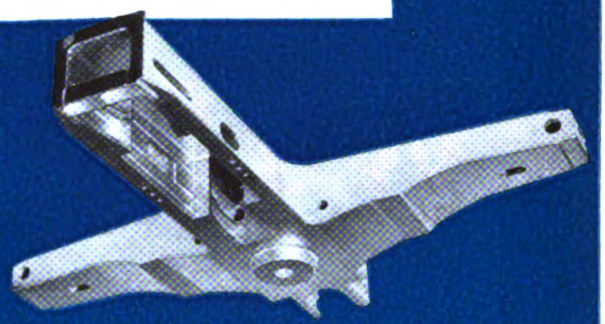
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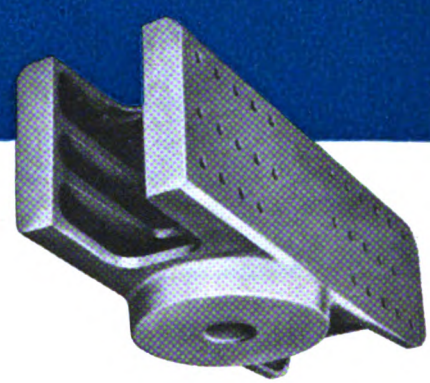


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Underframe End

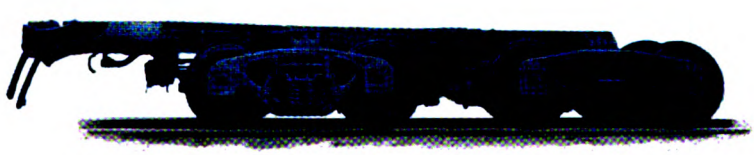
Buckeye Cast Steel COMPONENTS



Bolster Center Filler with
Integral Center Plate

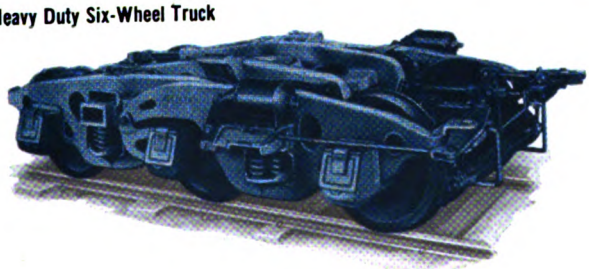


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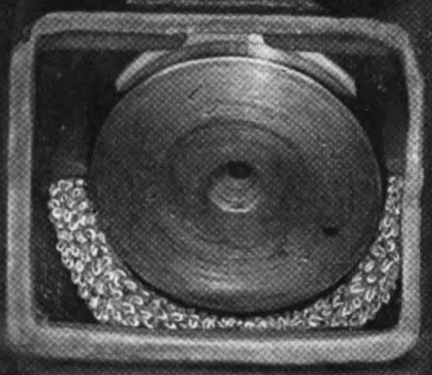


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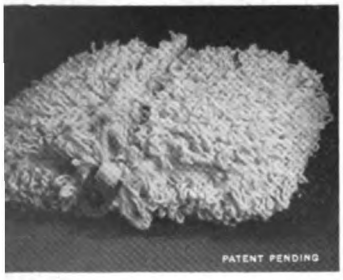


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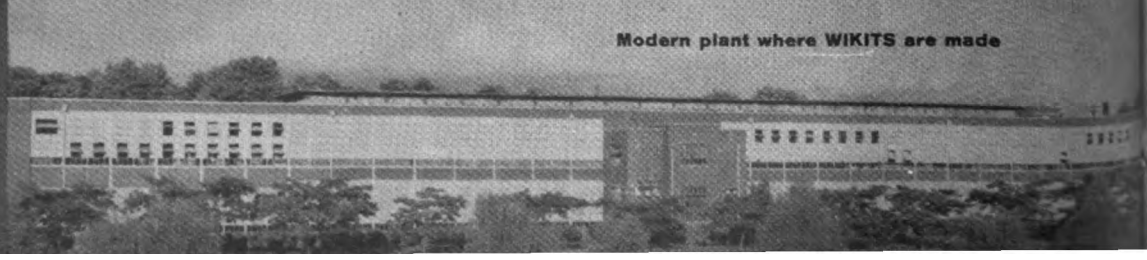
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America's Oldest Trade Paper
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REPORT FOR SEPTEMBER

ICC OK's Tank Car Without Running Boards

Construction of one type of tank car without side running boards will be permissible under a new Safety Appliance Standard recently published by the ICC. Tank cars without underframes need not have running boards, according to a modification of the U. S. Safety Appliance Standards effective October 1.

The Commission at various times over the past four years has considered and acted on the petition of the Union Tank Car Co. for the elimination of running boards. Following the first hearing, it modified Standards in July 1959 to permit operation of tank cars without running boards. In February 1960, this order was rescinded, meaning that the arrangement would be illegal (RL&C, Nov. 1960, p 8). In March 1961, Union Tank requested reconsideration of its case, and the latest hearings have resulted in the re-establishment of the arrangement as a safety appliance standard.

Previously, the Safety Appliance Standards have required side running boards on three basic types of tank cars—cars with side platforms; cars without side sills or with short side sills and end platforms; and cars without end sills. No standards have been prescribed for the type without center sills, because this is a new arrangement which UTL had just developed when its original petition was filed in August 1957.

Although Union Tank had first proposed complete elimination of the side running boards, it amended its petition after the first hearing to call for the installation of a handhold along the side of the car in the same relative location as the low running board. This handhold could be grasped by trainmen on the ground when bleeding air to release sticking brakes and was intended to overcome union objections to complete elimination of the running board. The Commission did point out that the three different arrangements now allowed do not have a standard running board height; that some existing cars have nothing on which a trainman can brace himself. The required side railing must be 1¼-in. pipe with 2½ in. clearance.

According to the Commission, the sole issue in the latest proceeding has been to determine if the petitioner's tank car without side running boards is in the public interest. "Today, trainmen seldom traverse the tops of cars in road service, but may do so in emergency," the Commission reported. "In switching or yard service, they traverse cars while running at slow speed, but generally descend to the ground when necessary to go from end to end of a car or cut of cars. While there is no prohibition against trainmen traversing the tops of cars or using running boards, railroads as a rule do not require them to do so and, in fact, discourage such action. It is practically impossible to traverse some cars, such as gondolas or hoppers, when empty, or when these cars are loaded with scrap, coal, or gravel that does not afford stable footing.

"We are impressed," the Commission continued, "by the fact that nearly half of all freight cars—such as hopper, gondola, and flat cars—owned by Class I railroads in the United States are not equipped with running boards and are not required to be so equipped by the Safety Appliance Standards. This strongly indicates that running boards, at least on certain type cars, are not needed."

Railroad Research To Be Seminar Topic

To guide research toward the devices, materials and procedures which will improve railroad operations and equipment, the AAR and the Armour Research Foundation are sponsoring a two-day Research Seminar in Chicago on November 2 and 3.

(Continued on page 7)

TIME SAVING IDEAS FOR SEPTEMBER

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(Continued from page 5)

According to W. M. Keller, AAR vice-president (research), the program differs from other research meetings held recently in that it will indicate the problems which should be the targets of railroad and supplier research.

New operating concepts, new designs, and raw materials will be discussed along with the late developments in laboratory procedures. The sessions will be held in the Sheraton Towers Hotel in Chicago, with Mr. Keller acting as program chairman.

The morning session on Thursday, November 2, will define the needs of the industry in the following areas:

- Equipment—P. V. Garin, manager mechanical engineering and research, SP.
- Right-of-way—R. H. Beeder, chief engineer (system), Santa Fe.
- Signaling—A. L. Essman, chief signal engineer (system), Burlington.
- Communications—T. W. Wigton, general superintendent communications, Burlington.
- Prevention of Damage to Shipments—O. J. Wullstein, general claims agent, Union Pacific.

The luncheon speaker will be H. A. Leedy, director of the Armour Research Foundation, who will speak on "Results of Industry Association Research in the United States." The afternoon session on November 2 will discuss solutions for railroad problems through research in the following areas:

- New Materials—C. R. Simcoe, supervisor, Alloy Development Section, Metals and Ceramics Research Division, Armour Research Foundation.
- New Methods—D. C. Turnbull, Jr., vice-president, research and development, Baltimore & Ohio.
- New Designs—N. A. Weil, director, Mechanics Research, Armour Research Foundation.
- New Concepts of Operations—J. W. Barriger, president, Pittsburgh & Lake Erie.

Laboratory utilization will be the topic of the morning session on November 3. The following subjects will be discussed:

- Compatibility of Laboratory with Actual Service Conditions—William Van Der Sluys, associate director, research and development, Pullman-Standard.
- Accelerating Data Development by Laboratory Methods—G. M. Magee, director engineering research, AAR.
- Applications of Computers to Railroad Research Problems—A. K. Hawkes, supervisor, Computer Applications and Operations Research, Electronics Research Division, Armour Research Foundation.
- Laboratory Organization—H. H. Melzer, chief engineer tests, Milwaukee.

The afternoon session on the second day will be devoted to Special Problems and Summary as follows:

- Balance Between Fundamentally New Mechanisms or Elimination of Inherent Weaknesses in Existing Mechanisms—A. V. Dasburg, manager yard and terminal development, General Railway Signal Co.
- Possible New Sources of Locomotive Power—R. M. Coultas, manager domestic locomotive sales, General Electric Co.
- Evaluation and Critique of the Seminar—W. M. Keller, vice-president (research) AAR.

Orders and Inquiries for New Equipment

Placed Since Closing of August Issue

Freight-Car Orders

CANADIAN NATIONAL. *Montreal Locomotive Works:* 40 70-ton steel covered hopper cars; 10 aluminum covered tank cars; 25 double-deck flat cars. *Canadian Car:* 150 box. For October-November delivery.

CANADIAN PACIFIC. *Marine Industries:* 100 70-ton covered hoppers.

CORN PRODUCTS. *General American:* 7 covered hopper cars.

DETROIT, TOLEDO & IRONTON. *American Car & Fdry.:* 75 covered hoppers. Estimated cost, $900,000. Immediate delivery.

DOW CHEMICALS. *General American:* 10 covered hopper cars.

GENERAL AMERICAN. *Company shops:* 75 30,300-gal, 66-ft long tank cars.

KATY.—*American Car & Fdry.:* 10 70-ton covered hoppers equipped with roller bearings and pneumatic outlets. Immediate delivery.

KOPPERS CO. *General American:* 2 covered hopper cars.

MILWAUKEE. *Strick Trailer:* 25 piggyback flat cars and 100 Flexi-Van trailers. Lease arrangement. Deliveries begun Sept. 1.

NORFOLK & WESTERN. *American Car & Fdry.:* 90 box cars equipped with DF loaders; 10 box cars with hydraulic cushion underframes. Cost, over $1,250,000. Deliveries scheduled to begin in October. *Co. shops:* 100 70-ton, 30-cord-capacity pulpwood cars. Approx. cost, $1,000,000.

NORTH AMERICAN CAR. 125 automobile rack cars for NITX pool. 50 ACF 89-ft Low Levels and 50 P-S 89-ft Lo-Deks to be assigned to New York Central, and 25 P-S 85-ft flats to be assigned to Denver & Rio Grande Western.

SOUTHERN PACIFIC. *Bethlehem Steel:* 50 flat cars. Immediate delivery. *General American:* 100 piggyback flats. For October delivery. *Baldwin-Lima-Hamilton:* 40 86-ton gondola cars for handling wet copper concentrate.

Passenger-Car Orders

SOUTHERN PACIFIC. *Pacific Car & Fdry.:* 25 baggage cars. For delivery by Jan. 1.

Notes and Inquiries

General American built 100 tank cars during July, including 21 30,300-gal, nine 20,500-gal, and 18 20,000-gal units. Remainder ranged between 16,000-gal and 4,000 gal capacity.

Philadelphia Passenger Service Improvement Corp. has received a bid from the Budd Co. for the construction of stainless-steel commuter cars which PSIC plans to acquire and lease to the Pennsylvania and Reading. Budd offered to build 24 stainless-steel cars for $6,186,500, or 54 cars for $13,518,900. Bids were not received from other builders. Opening of bids was originally scheduled for July 5 but was delayed at the request of PRR and Reading, which wanted to draw up alternate specifications.

Southern asking for bids for construction of 200 4,800-cu ft, 100-ton aluminum covered hopper cars. Delivery to begin within 60 days at a rate of 40 cars a week.

Trailer Train directors have authorized purchase of 600 cars, including piggyback and cars designed for auto-rack service. For third quarter delivery.

ASME Moves to New Headquarters

The American Society of Mechanical Engineers has moved from 29 West 39th st., New York, to the recently completed United Engineering Center at 345 East 4th st., New York, where all New York facilities of the Engineering Societies are being centered. The former Engineering Societies Building, where the ASME had been housed for 55 years, was opened in 1880.

Personal Mention



John G. German
MP



D. F. Marston
GN

Akron, Canton & Youngstown.—*Akron, Ohio:* H. L. BULLOCK, superintendent motive power, appointed superintendent of motive power and cars, with jurisdiction over all car department operations.

Elgin, Joliet, & Eastern.—*Gary, Ind.:* CHARLES H. COOK, division general car foreman, has assumed direct supervision and responsibilities of car department, Gary division, succeeding CLARENCE C. LARSON, retired. Position of assistant superintendent car department abolished.

Great Northern.—*St. Paul, Minn.:* DONALD F. MARSTON, appointed superintendent of motive power, succeeding JOHN G. GERMAN, resigned. RICHARD G. TAUSCH appointed assistant to chief mechanical officer, succeeding Mr. Marston. *Hillyard, Wash.:* LAWRENCE R. SEAHOLM appointed shop superintendent, succeeding Mr. Tausch. *Havre, Mont.:* KENNETH W. BATCHELLER appointed shop superintendent, succeeding Mr. Seaholm. *Great Falls, Mont.:* EUGENE C. COAN appointed master mechanic, succeeding Mr. Batcheller. Mr. Coan formerly mechanical assistant, Kalispell division.

Missouri Pacific.—*St. Louis, Mo.:* JOHN G. GERMAN appointed chief mechanical officer, succeeding L. RAY CHRISTY, retired. Mr. German formerly superintendent of motive power, Great Northern.

Mr. German, a graduate of Case Institute of Technology (B.S. in mechanical engineering), began railroad career in 1943 as assistant to the master mechanic, Great Northern, at Spokane, Wash. Subsequently served as traveling engineer; master mechanic; assistant to mechanical officer, and, late in 1958, superintendent of motive power.

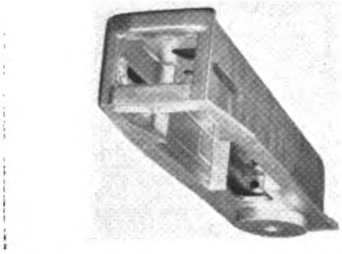
Norfolk & Western.—*Bluefield, W. Va.:* RUSSELL R. MCDANIEL appointed master mechanic, Pocahontas division, succeeding WALLACE M. TUCKER, deceased. *Norfolk, Va.:* WALTER A. GRIGG appointed master mechanic, Norfolk division, succeeding Mr. McDaniel. *Roanoke, Va.:* EDWIN H. WERNER, assistant electrical engineer, appointed electrical engineer succeeding Mr. Grigg. RUSSELL S. WHITE, electrical inspector, named mechanical inspector.

Northern Pacific.—*St. Paul, Minn.:* J. D. KROHNE appointed assistant to mechanical

(Continued on page 86)

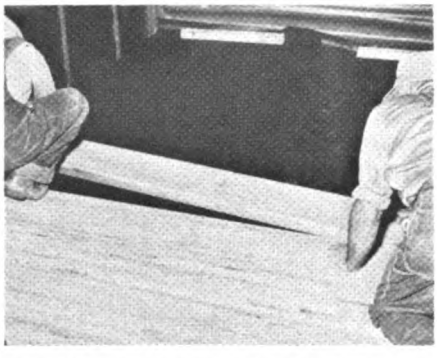
LOCOMOTIVES AND CARS **WHAT'S NEW** IN EQUIPMENT

Products of Exhibitors—Allied Railway Supply Association
(Not previously described in Railway Locomotives and Cars)



Underframe End Castings

Higher strength and improved service, it is said, are obtained with cast-steel underframe ends. The basic type, applicable to box and refrigerator cars, combines the draft arm and body bolster. The draft-arm casting, the latest model designed for hopper cars (illustrated), has been increasingly popular during the past year. Both types are applicable to new or rebuilt cars. *Buckeye Steel Castings Co., Dept. RLC, 2211 Parsons ave., Columbus 7, Ohio.*



Laminated Car Decking

According to the manufacturer, fork lift trucks, for about two years, have been handling loads up to 26,000 lb per wheel over Doweloc edge-grain laminated hardwood car decking with no appreciable wear or breakdown. The panels can be applied either in only the doorway area or through the full deck. They are custom manufactured to exact requirements in width and length and are so machined as to permit immediate installation without reworking in the wood mill. Panels are sanded on both faces to make smooth decks and are treated to prevent expansion, contraction, and rot. Installation labor is said to be reduced up to 50%. *Doweloc Div., D. B. Frampton & Co., Dept. RLC, Huntington Bank Bldg., Columbus 15, Ohio.*

Detergent Cleaner

Nuvat, a non-scumming, heavy-duty chelated soak cleaner based on synthetic-type detergents, is formulated for vat cleaning of ferrous metals. It can be used for copper, brass, nickel, and magnesium, as well as for steel and cast iron. It can be used at low concentrations and over a wide range of temperatures even under heavy soil loads for loosening and removing grease, encrusted carbon deposits, and paint. The cleaner is non-dusty and non-caking, dissolves readily and completely, develops no disagreeable odors or fumes even at boiling temperatures, contains no cyanides, chromates or cresols, and rinses freely regardless of water hardness. *Railroad Dept., J. B. Ford Div., Wyandotte Chemicals Corp. Dept. RLC, Wyandotte, Mich.*



Shop Truck

The Super 7 Cary-Lift can reach across cars and flat bed trucks; is capable of making free lifts of 13 ft 1 in., and has a lifting capacity of 7,250 lb. It features a hydraulic forward reach of 4 ft 6 in. at ground level and the power steering, three-point hydraulic brakes and two-speed powershift transmission. Quick change attachments include forks, dozer blade, 1¼-yd bucket and crane boom. *Pettibone Mulliken Corp., Dept. RLC, 4700 West Division st., Chicago 51.*



Automated AB Tester

The Wabcomatic test console for automated testing of AB valves is programmed by code-punched tape to test valve portions according to test procedures previously conducted manually. Tests deal with pressures and flow within specified time limits. Automated procedure merely requires the operator to place the portion on holding studs of the console, press the clamping button and then the program-start button. As the program runs through, test results are automatically printed in sequence on pressure-sensitive tape—in black to indicate pass; in red, to indicate fail. On completion, the tape is detached from the printer and affixed to the portion which is placed on the pass or rework conveyor. Average maximum output of the console is rated at 80 portions per day, compared with 25 for a manual rack. As the test sequence lasts approximately 5½ min., one man can easily operate adjacent consoles to test 300 portions per day. Automated testing insures valid testing as it eliminates human tendencies favoring marginal acceptance. Savings are estimated to produce an annual return of up to 40% on the investment. *Westinghouse Air Brake Co., Air Brake Division, Dept. RLC, Wilmerding, Pa.*



Dust Guard

The Callaway dust guard has tough, resilient, oil-impervious urethane outer surface and a urethane foam core. Oil collected from the axle surface is returned to the journal box through a relief in the dust guard side to minimize oil leakage. The guard, it is said, functions without tearing or distortion after impacts and is unaffected by ambient temperature extremes. *Callaway Products, Inc., Railway Products Div., 295 Fifth ave., New York 16.*

Wheel Machining Tools

A car-wheel boring tool (above) using standard throw-away inserts makes it possible to eliminate grinding costs. The tool reduces changing time and cuts down time for wheel-boring machines. Solid-carbide tapered-side inserts for wheel-truing cutters

(Continued on page 10)



t Pending

NEW! Wine Power Geared* Discharge Gate

EN UNDER A 70-TON LOAD one man can open this r gate. Accurately machined mating surfaces provide d-free operation and a tighter seal. No more sledging car damage in attempts to open "frozen" hopper doors. ctric steel castings eliminate distortion.

ECISION-MESHED GEARS without costly machining! azingly accurate shell molding process helps keep unit petitively priced despite *Power-Gear* features. Rack-and-on principle assures parallel operation without side bind-All bearing surfaces are lubricated with Moly Disulfide.

COMPLETELY PREASSEMBLED for easy installation, ready for welding. No further fitting, no extra parts required during assembly of car. 13x24" opening fits most standard chutes. Interchangeable with most present gates; equipped with standard boot groove. Conforms to all recognized unloading devices. Now in service on six major railroads and a car leasing company.

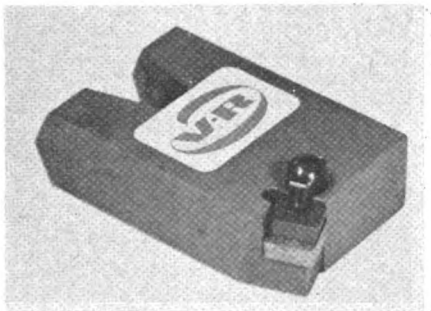
A TRIAL APPLICATION WILL CONVINCE YOU! Complete specifications and application data on request.

WINE
Railway Appliances

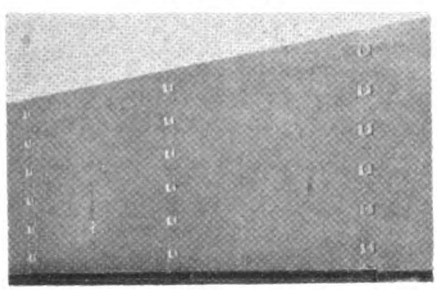
WINE Railway Appliances by UNITCAST CORPORATION • TOLEDO 9, OHIO

See this product at
BOOTH 235
at the ALLIED SHOW

WHAT'S NEW IN EQUIPMENT—*(Continued from page 8)*

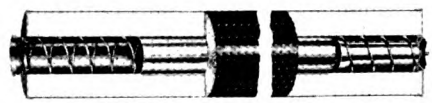


are also available. By using solid carbide inserts instead of the "brazed on" type, brazing strains are eliminated; inserts remain dimensionally stable under high cutting heat, and are easy to remove from the cutter body if damaged. *Vasacoloy-Ramet Corp., Dept. RLC, Waukegan, Ill.*



Lading Anchor Bar

A continuous bar anchor, applicable to steel box-car linings, is welded to Z-bar posts between the lining sections. The patented tongue design of the bar anchor speeds application and removal of steel strapping. The bar, available in varied lengths, may have anchors spaced as specified. No shimming is required; plate and anchor are flush with plywood lining. *MacLean-Fogg Lock Nut Co., Dept. RLC, 5535 N. Wolcott ave., Chicago 40.*

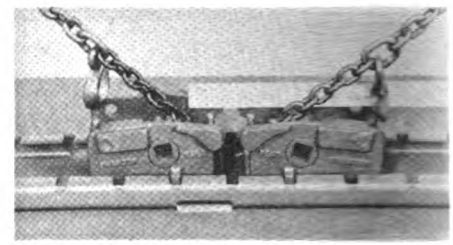


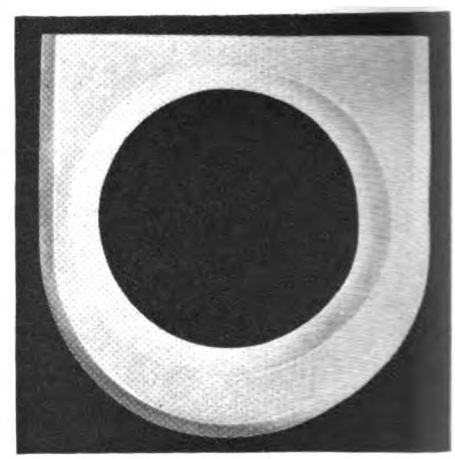
Lube Oil Filter

This pleated-paper filter cartridge for diesel locomotives is said to provide positive filtration, high flow characteristics, large filtering capacity, and controlled porosity. It is a full-flow, cageless type. The filter paper is corrugated as well as pleated. Shell stock has high density. End caps are tin plate. The perforated center tube encloses a 12-gage reinforcing spring. At the top is a Hycar spacer grommet. *M & J Diesel Locomotive Filter Corp., Dept. RLC, 30 West Monroe st., Chicago 3.*

Auto Tie-Down

An automatic safety latch for a more positive lock under impact and vibration has been provided on the improved Auto-Tie, a device for multi-level rail shipment of automobiles. The winch drum design and method of attaching the chain allows a quick change of chain without removing the winch from the anchor channel. The drum gives an 8-in. take-up for one full turn, eliminating chain jamming. Maximum load capacity requires winch anchoring at 3-in. increments for the full length of the car. The winches can be moved to any desired position without removing and reapplying bolts. *Brandon Equipment Co., Dept. RLC, 332 South Michigan ave., Chicago 4.*





Dust Guard

The Frost dust guard, injection molded of high-density polyethylene, is said to resist cold and not shatter at minus 45 deg F. It resists heat and maintains its characteristics at excessive temperatures, and its low porosity makes it practically impervious to water and oil at temperatures up to 175 deg F. *Frost Railway Supply Co., Dept. RLC, 2920 East Jefferson ave., Detroit 7 Mich.*

Coating for Cars

A two-coat, high-gloss finish can be obtained in 4 to 6 hr with the Tuff Fast-Dry enamel system. The one-to-one component ratio of the Tuff epoxy coating is said to provide easier mixing and application than present epoxy systems. It has high corrosion resistance and improved gloss and color retention. Both coatings are available as complete systems with rust-inhibitive primers. *Archer-Daniels-Midland Co., Dept. RLC, 700 Investors Bldg., Minneapolis 2, Minn.*



Bulkhead Type Flat Car for Plasterboard

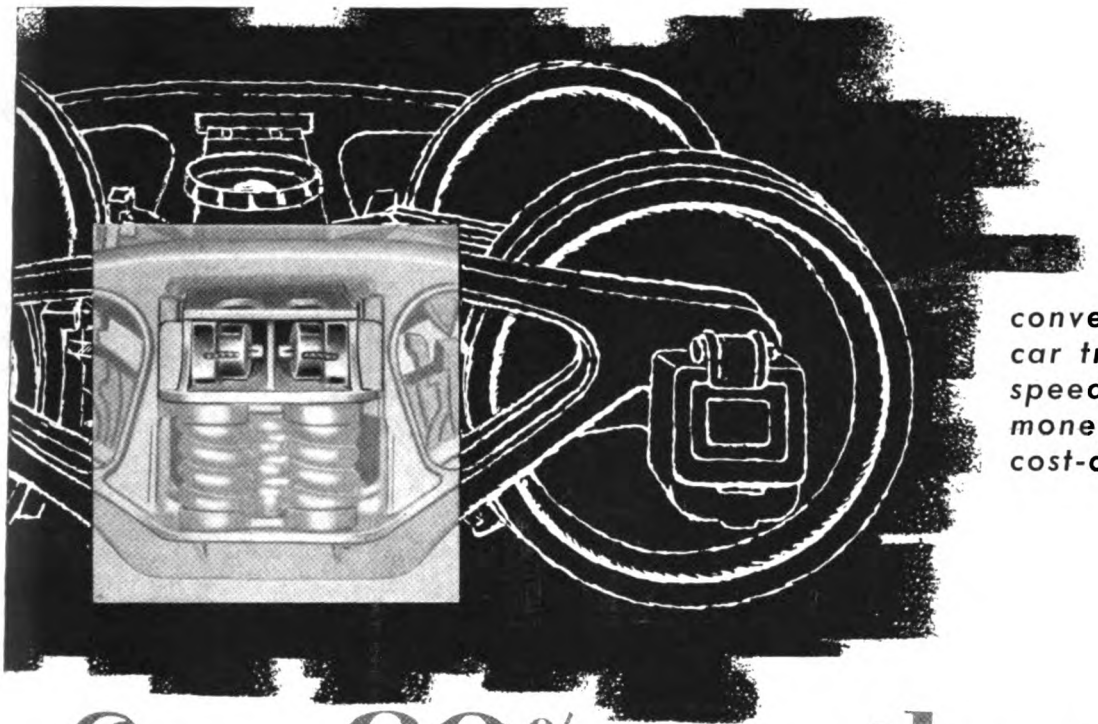
The rolled structural steel beams and castings employed in the underframe of a new bulkhead flat car are said to offer high strength and low maintenance in the critical bolster and draft sill areas. Such cars are now in service carrying plasterboard.

Also available is an 85-ft piggyback car incorporating a long-travel, high-capacity cushion underframe which permits the solid tie-down of trailers and containers. Impact forces usually absorbed by the conventional tie-downs are cushioned by the action of the underframe *Bethlehem Steel Co., Dept. RLC, Bethlehem, Pa.*

Shop Carrier

A new type Rail-Roader has been designed for changing car wheels, couplers, etc. It is built around the 8-ton design and features full reversing transmission for equal speeds forward-reverse for track operation. Mechanically operated dollies front and rear

(Continued on page 13)



convert old freight car trucks to high speed service this money-saving, cost-cutting way!

Save 80% over the cost of new Freight Car Trucks

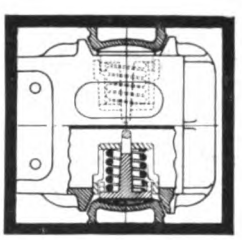
with the NEW HOLLAND RIDE STABILIZER RS-2

There's no need to let those serviceable old Freight Car Trucks be limited to slow speed service when you can convert them to profitable operation at a fraction of the cost of new trucks...The Holland Ride Stabilizer RS-2 has proven to give the same high-speed, lading-protecting, easy-riding characteristics you get in new, costly freight trucks.

You can convert any bolster of A. A. R. approved design and stabilize the ride laterally, vertically and longitudinally...The direct spring loaded control system of the Holland RS-2 **does not** cause uneven wear of the Journal Bearing when abnormal forces are exerted. Wedge made pressures just **do not** occur. Installation of the RS-2 components is unusually simple...And Holland Engineers will give you on-the-job assistance.

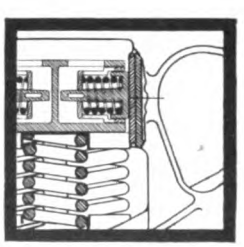
Write or call for the new Tell-All Bulletin RS-2.

NEW



New Large control spring for full face pressure, longer life.

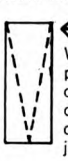
NEW



New Center Retention Means for simplified assembling and dismantling.



RS-2 Spring cushioned pressures do not disturb load distribution on the journal.



Wedge made pressures disturb load distribution on the journal.

Holland Volute Snubber Springs



Either 2½" or 1⅜" Spring Travel.



STYLE E-2 Volute Snubber Spring, 2½" Travel in 50 Ton Group.

Upgrades ride by introducing an unusually smooth snubbing action with an exceptionally high load carrying capacity. Holland's principle of utilizing the sliding action of telescoping radially compressed coils with ample friction area eliminates the "bombarding" problem. 518R

HOLLAND COMPANY

332 S. MICHIGAN AVE. • CHICAGO 4, ILLINOIS

for the finest in freight car truck controls!

New

Liquid Cleaner

OAKITE

202

Cleans everything...economically

A new, "use it everywhere" liquid detergent —Oakite 202—now offers the greatest convenience EVER in cleaning. It goes into water solution quickly without waste... without fire hazard. You spray, mop or brush it on.

Oakite 202 forms a rich, sudsy solution that's packed with cleaning power. It knifes through road grime, grease, scuff marks—even dried-on bug deposits. Use it wherever you have a tough cleaning problem. It does a wonderful job washing diesel interiors and exteriors. And it certainly does a job on passenger car interiors. It lightens oily shop floors, brightens greasy equipment. It's safe for any surface, including aluminum. It dries down without streaking.

But here's the BIG pay-off—Oakite 202, in mild solutions, *out-performs* stronger solutions of other cleaners. This makes 202 a most economical *all-purpose* material.

Ask your local Oakite man for a convincing see-for-yourself demonstration without obligation. Or send for free bulletin to Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

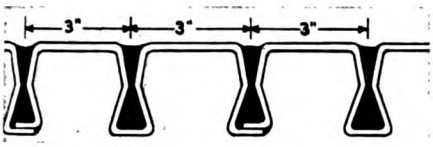
OAKITE®

SCIENCE

over 50 Est. 1909

years' leadership in industrial cleaning

enable the vehicle to travel over highway or rails. The carrier is equipped with a four-man crew compartment; 50-ton electrically driven jacks; a 6,000-lb capacity hydraulic crane; a Power-Pak unit for welding and cutting, and miscellaneous equipment. *Schield Bantam, Dept. RLC, Waverly, Iowa.*



Nailable Steel Flooring

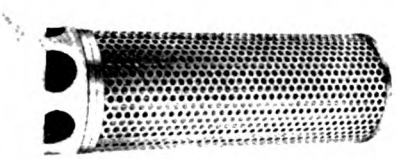
Designed to support the heaviest of lift-truck wheel loads, the Tri-Rib flooring provides nailing grooves on 3 in. centers. The grooves are formed by the self-contained reinforcing ribs which are said to be so closely spaced that additional reinforcement is unnecessary below this flooring. Alternate ribs are lapped, further increasing floor strength. Also available is a rib filling material which will not adhere to lading resting on it and which prevents debris from filling nailing grooves. *Transportation Specialties Co., Dept. RLC, 80 East Jackson Blvd., Chicago 4.*

Steel Wheels

To facilitate the use of piggyback cars on routes with existing low clearance tunnels, a 28-in. one-wear wheel has been added to the Griffin line of pressure-poured EQS steel wheels. To comply with the new AAR

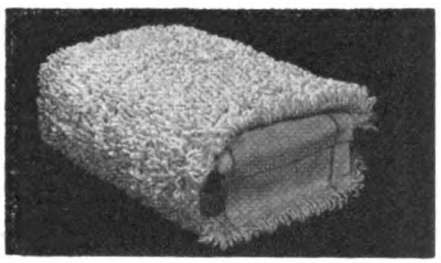


regulation, a 36-in. one- and two-wear wheel has also been added for use on cars with over 70-ton loads. *Griffin Wheel Co., Dept. RLC, 445 North Sacramento Blvd., Chicago 12.*



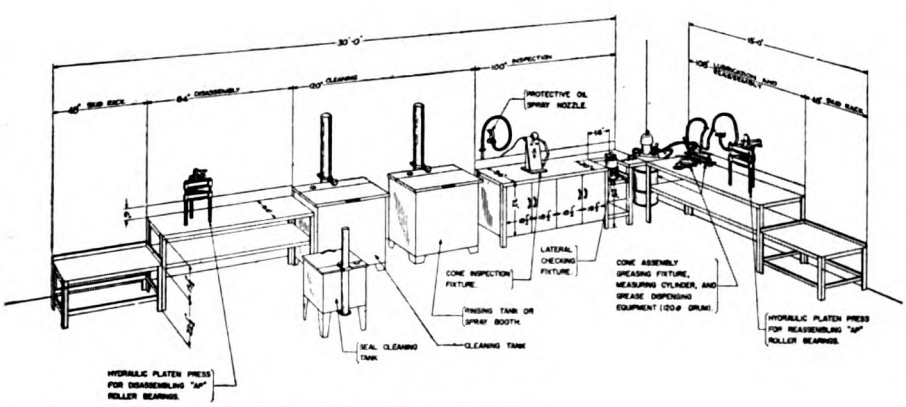
Oil Strainers

The PC oil strainer cartridge for EMD 567 engines fits existing strainer housings without modification. By crimping the strainer screen, filter area has been doubled while minimizing oil flow resistance. Although finer mesh screen is used, the total "open area" of the strainer is actually greater. Screens are protected by perforated metal shields so the new strainer can be handled during cleaning without risk of being damaged. The PC strainer is attached to the existing casting head by a single T-bolt which is locked in place with a slotted nut and cotter; installation takes 10 to 20 min. Two types are available—the lube oil strainer with 40-60 mesh screen and the scavenger pump strainer with 8 coarse mesh screen. *Farr Co., Dept RLC, P. O. Box 90187, Airport Sta, Los Angeles 45.*



Journal Lubricator

A specially formulated acrylonitrile foam rubber (Nalur) is the core of the Magpad lubricator. The rubber, said to be highly resilient, with low oil swell characteristics, resists compression set at high temperatures. The outer cover of the lubricator is a heavy chenille, lock-stitched to withstand a 10-lb minimum pull on tufts. End closures are cotton belting. Internal wicking is provided by 25-ply candlewick routed through ½-in. vertical orifices which give unrestricted flow of oil. *Magnus Metal Corp., Dept. RLC, 111 Broadway, New York 6.*



Roller Bearing Maintenance Shop

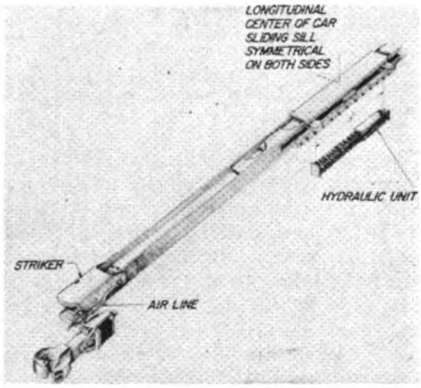
A bench layout, designed to disassemble, clean, inspect, lubricate and reassemble railway bearings in the shortest possible time and with a minimum of difficulty, has been recommended by bearing manufacturers and the AAR. The layout can be modified to suit the requirements of any shop with regard to the number of bearings to be serviced. While this layout is set up for a flow of bearings from one end to another, shops with less demand for bearing maintenance could modify the number of benches and amount of equipment used; one platen press could be used for disassembly and assembly. *Timken Roller Bearing Co., Dept. RLC, Canton 6, Ohio.*

Air Dryers

Forty sizes are now included in the Van-Air line of compressed air dryers designed to intercept acid fumes and microscopic particles during regular process of extracting water and vapors from the air system. Capacities range from 7.5 to 11,080 cfm at 100 psi. The smaller capacities are designed for brake testing, spraying units, and remote tools, as well as for diesel locomotives. *Van Products Co., Dept. RLC, Erie, Pa.*

Car Cushioning Devices

The National 3C sliding sill assembly package fits any AAR standard center sill using such standard items as operating rods, striking castings, center plates, center fillers, yokes, draft gears, yoke support plates, yoke keys, and brake pipe. The sill has 24 in. travel and uses AAR standard couplers. Impact track testing indicates a reduction of up to 82% in coupler force and 80% in lading force. The entire package is supported at



each body bolster, cross-bearer, cross-tie, and end, with the supports tying both sides of the standard sill together. The car body is connected to the sliding sill through the hydraulic unit by means of horizontal keys inserted at each end of the 8-ft hydraulic pocket. Keys extend from one side of the stationary sill through the slot of the sliding sill to the other side of the stationary sill.

The long-travel NH-24 hydraulic draft gear has been designed for application to 85-ft cars, one unit being located at each end of the car. The gear has been applied to the Bethlehem Steel new all-purpose flat car. It has 24-in. hydraulic travel, plus 2-in. rubber-cushioned travel in buff and 2-in. rubber-cushioned travel in pull at each end of the car. When tests are completed, the gear will be available as a complete package, including the striking casting. *National Castings Co., Dept. RLC, 10600 Quincy ave., Cleveland 6, Ohio.*

Piggyback Car

A multi-purpose flat car, suitable for handling triple deck auto racks, trailers, containers, or general cargo, is 87 ft long. The full 87-ft length of the loading area, which is equipped with new type tie-downs, can be used by the shipper. Cushioning is provided by the Hydra-Cushion underframe. When used as an auto-carrying car, 12 regular size cars or 15 compacts can be transported. Racks are removable, making the car adaptable for one, two, or three deck use. *Evans Products Co., Dept. RLC, Plymouth, Mich.*



Flat Car for Transporting Coiled Tin Plate

The 90-ton capacity car for transporting coiled tin plate can handle eight coils weighing up to 20,000 lb each under its weatherproof covers. The covers also fold so that either fork lifts or overhead cranes can be used for loading and unloading. No dunnage is necessary. The hand-operated covers stay on during unloading. The load restrainers in which the coils are secured are easily operated and are said to give impact protection at speeds up to 9 mph. The car is 53 ft 6 in. over end sills and 49 ft 6½ in. between bulkheads. Floor width is 10 ft.

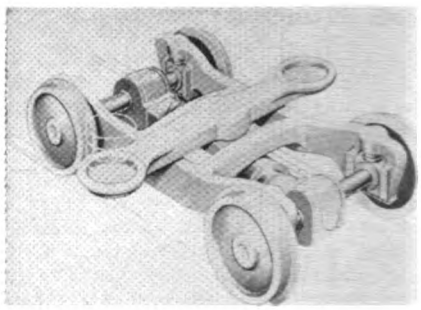
A covered hopper which can be modified to handle a variety of chemicals is also available. Its center discharge doors are said to make unloading simpler. *Thrall Car Manufacturing Co., Dept. RLC, P.O. Box 218, Chicago Heights, Ill.*

Protective Coating

An alkyd resin derivative using naphtha as a vehicle, when applied to plated or coated metal surfaces, forms a clear protective coating which is said to be extremely resistant to rust, corrosion, and oxidation. Bom-Kote may be applied by brush, spray, dip, roller, or flo-coat method, depending on size and contour of surface to be protected. When properly applied, it is said not to crack, chip, peel, or discolor with age. *Bom-Kote Corp., Dept. RLC, 919 North Michigan ave., Chicago 11.*

Passenger-Car Truck

A lightweight, high-speed, passenger-car truck, the General-70, is applicable to almost all cars—main-line, commuter, and rapid transit. The bolster springs are arranged between the car body and truck bolster, instead of between the truck bolster and frame. The one-piece bolster and frame gives maximum durability and strength as well as true alignment of wheels. The wide spacing of springs and their unusual height above the rail improves riding quality. The truck offers a high degree of roll stability, at the same time accommodating soft vertical springing. While the



General-70 trucks normally include a patented arrangement of springing, any type of springs—Pirelli, coil, air, or air-coil—can be provided. The truck design can also accommodate a wide range of motors and drivers for different applications. *General Steel Industries, Inc., Dept. RLC, Granite City, Ill.*

Journal Roller Bearing

A heavy-duty roller-bearing assembly for freight-car journals, the Bower bearing has the same basic design as tapered roller bearings now in use. It is a rotating-end-cap model. Materials, heat treating, surface finish, and internal tolerances are chosen to give long-life service. Bearings are available for the standard journal sizes. *Bower Roller Bearing Div., Federal-Mogul-Bower Bearings, Inc., Dept. RLC, 3040 Hart ave., Detroit 14, Mich.*



Tank Car for Handling Liquid-Oxygen

Liquid oxygen is now being shipped in 65-ft, 15,000-gal "Lox" tank cars designed to move their cryogenic (super-cold) ladings at almost 300 deg F below zero. The car has a double-shell tank much like a giant thermos bottle. The vacuum space between the inner and outer shells contains perlite insulation. Shells are held together by a system of rods which suspend the inner shell within the outer one. Rod suspension absorbs train impacts and allows shell to expand toward car's center where all loading and unloading fittings are located. *Union Tank Car Co., Dept. RLC, Whiting, Ind.*

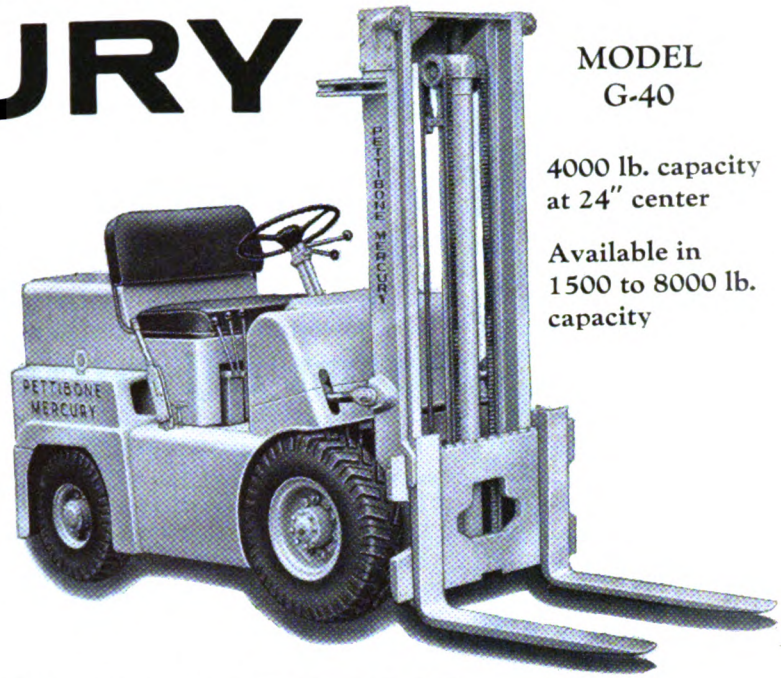
Lubricating Oil Filter System

Pleated paper filter cartridges in the Pamic lubricating oil filter system are said to keep oil in prime operating condition three to four times longer than other types made of linters, shredded waste, etc. Improved filtering, combined with an external emergency by-pass arrangement, assures maximum engine protection under a full range of severe operating conditions. The filter is designed for a maximum oil flow of 275 gal per min with a pressure drop of 1.5 psig

(Continued on page 76)

PETTIBONE MOST COMPLETE LINE OF MATERIAL HANDLING EQUIPMENT

MERCURY



MODEL G-40

4000 lb. capacity at 24" center

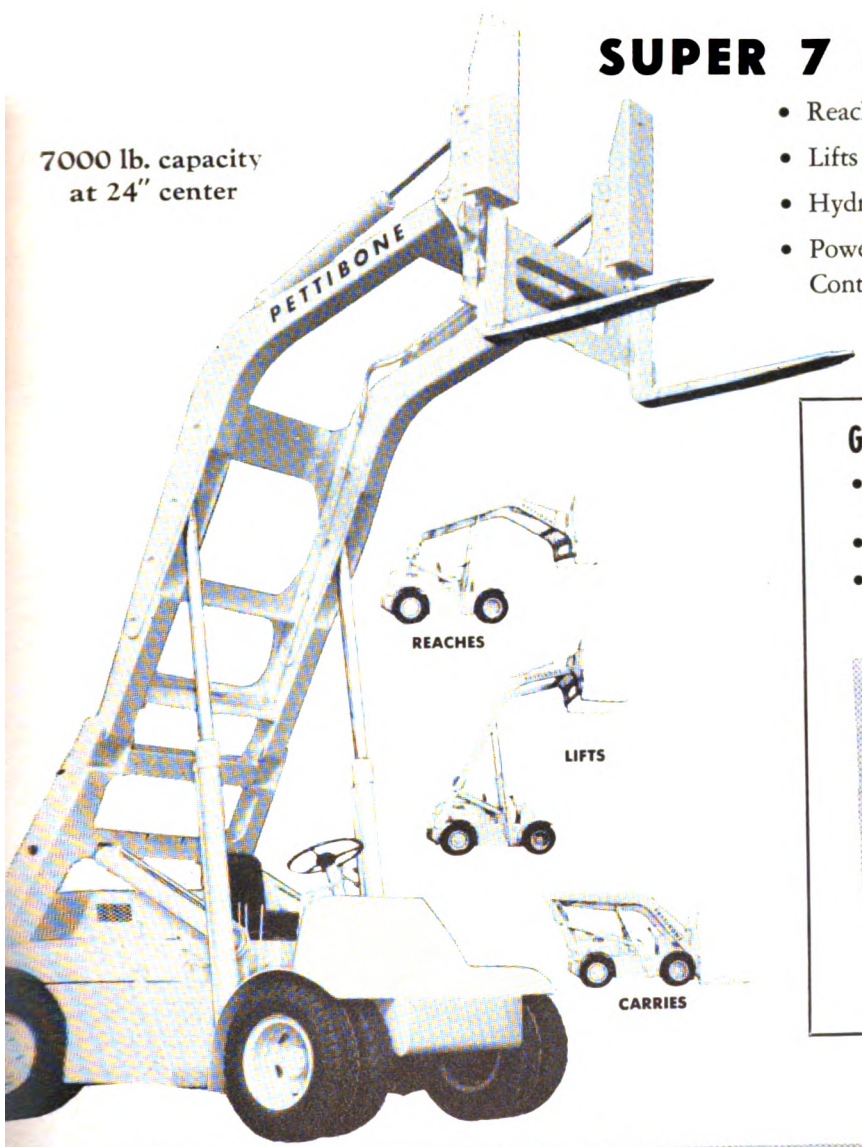
Available in 1500 to 8000 lb. capacity

AS POWERED LIFT TRUCK

- Exclusive inching control clutch, unconditionally guaranteed for one year.
- Unitized body and frame gives extra strength, longer life.
- Tilt back hood for immediate bench high service.
- Power Steering—3 point Hydraulic Brakes.
- Cushion or Pneumatic Tires.

SUPER 7 CARY-LIFT

7000 lb. capacity at 24" center



- Reaches across rail cars and flat bed trucks.
- Lifts 13′ 1″ (All free lift)
- Hydraulic 4′ 6″ forward reach at Ground Level.
- Power Steering—Automatic Transmission—Inching Control.

GAS TRACTOR—PNEUMATIC OR CUSHION TIRES

- Small rugged 4 Wheel Gasoline Tractor
- 62″ turning radius
- Double reduction drive axle with demountable wheel rim and tire assemblies
- Self-energizing Hydraulic Brakes
- Transports loads efficiently and economically



MERCURY "BANTY"

PETTIBONE MERCURY
FORK TRUCKS · TRACTORS · TRAILERS

PETTIBONE MULLIKEN CORPORATION

RAILROAD DIVISION

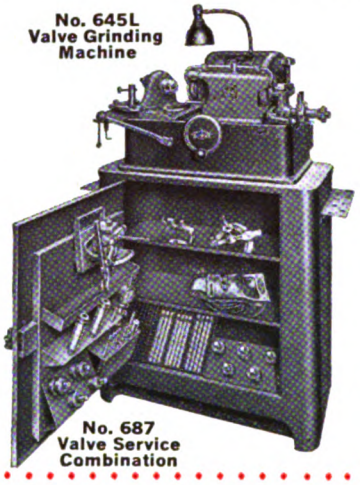
41 W. JACKSON CHICAGO 4, ILL.

80 Years of Service to the Railroad Industry

More valves are ground on SIOUX equipment than all other kinds combined

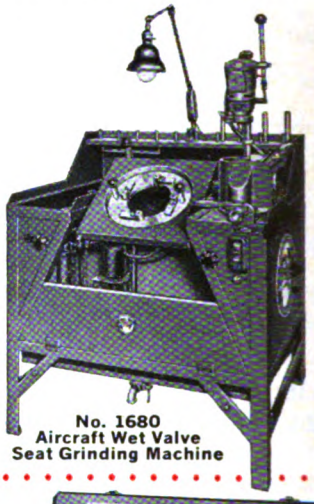


1ST CHOICE

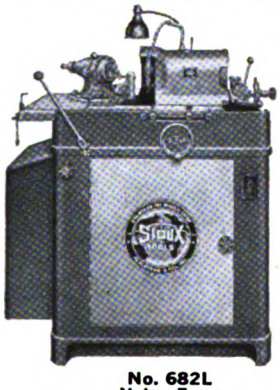


No. 645L
Valve Grinding
Machine

No. 687
Valve Service
Combination



No. 1680
Aircraft Wet Valve
Seat Grinding Machine



No. 682L
Valve Face
Grinding Machine



No. 1750BB
Valve Seat
Grinder Set



No. 1675BB
Aircraft Valve Seat
Grinder Set

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EDITORIALS

'Coordinated' Values

Over the years the annual meetings of the Coordinated Associations have demonstrated their value to the railroad industry. The meetings this September 11-13 at Chicago will improve on the record for two reasons.

First, we know that many very capable railroad men have been making year-long preparations to present outstanding programs before the four associations. We know because we have been privileged to participate in some of the planning sessions. The associations' officers have been insistent that every committee report make significant contributions toward improving the railroad's position in the transportation industry. Both the officers and committee members are aware that the hard-pressed railroad industry must make every nickel count. The investment in men's time and energy for annual meetings of associations must offer a return on the investment as expected from the investment spent for new equipment. The return on investment in association participation is difficult to assess, but we are sure that no railroad will be disappointed—if every man in attendance gets out of the meetings the full value that has been and will be put into them.

Second, the Allied Railway Supply Association has scheduled very fine hotel and track exhibits during the meetings. The new products to be displayed, as reported in this issue, demonstrate the contributions made by the supply industry to improved railroad operation and service. Every man in attendance will get valuable ideas on how these developments can help his railroad.

It is up to every man to take advantage of the opportunities to benefit himself and his railroad by getting full value out of the inherent advantages of the meetings and exhibits.

'Off Again, On Again . . .'

Years ago a mythical section foreman wired his famous report: "Off again, on again, gone again—Finnigin." Early last month the Interstate Commerce Commission served a Safety Appliance order which is the latest action in a chain of events that could be paraphrased in almost the same terms that Finnigin used in Strickland Gillilan's poem.

About four years ago the Union Tank Car Company developed its "Hot Dog" tank car design in which the center sill is eliminated by utilizing the tank to transmit draft and buffing loads. A part of this design called for elimination of the side running boards, which could make possible tanks of larger diameter. Because tank car running boards are specified by the Safety Appliance Standards, Union Tank petitioned the ICC in August 1957 for a modification which would permit use of a tank car without running boards. It was pointed out that running boards are not required on many other types of cars.

The petition was denied without hearing early in 1958. Following reconsideration, an examiner again recommended denial in April 1958. UTL then redesigned its car to counter objections raised by the Railway Labor Executives Association; principal change was addition of handrails along the lower sides of the tank in the same relative location as the running boards. In April 1959 the original petition was ammended to include this feature. In July 1959 this design was accepted by Division 3 as an addition to the Safety Appliance Standards.

Following RLEA petitions for reconsideration and finally for outright suspension of this action, the ICC first denied a review hearing and then in February 1960 vacated its 1959 order which had legalized the arrangement. Division 3 entered its report in March 1961 denying the Union Tank petition. On June 27, 1961, Union Tank petitioned for reconsideration. On August 2, 1961, the ICC reaffirmed the findings of July 1959 and ordered that, effective October 1, 1961, tank cars without center sills can operate with handrails instead of running boards. The Hot Dog tank car may have passed its last legal hurdle.

What does all this mean? It only indicates that there is much more to car design than mechanics, materials, and manufacturing methods. Measures imposed by legislatures and government agencies can play major roles. While Finnigin's report resulted from his supervisor's order to be brief, neither speed nor brevity seems to characterize most government regulatory action. Certainly the uncertainties of this case have done little to inspire car builders to push ahead with the design of tank cars which might improve the competitive position of the hard-pressed roads.

Performance Is the Criterion

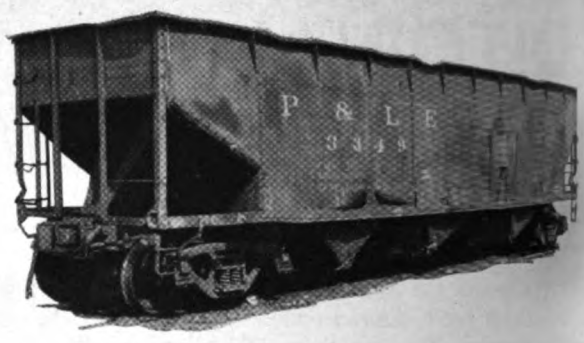
Many comments have been made and much speculation has been raised about the Krauss-Maffei 4,000-hp diesel-hydraulic, described elsewhere in this issue, that will be running on American rails this fall, probably in October. Of all the questions raised about these units the one of primary importance to be answered is: Can they outperform the diesel-electric locomotives in the service for which they are designed?

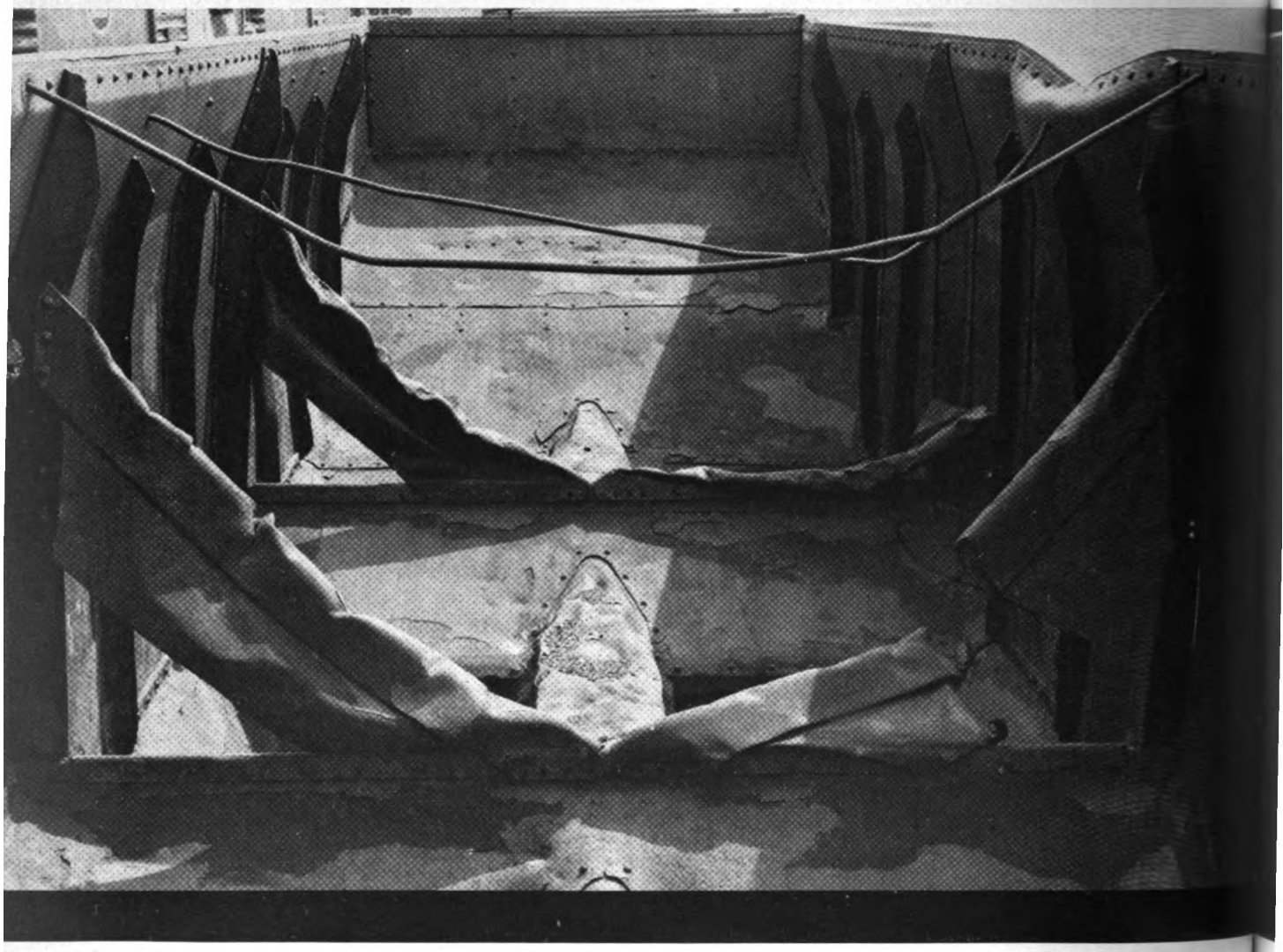
We believe all questions of politics, maintenance and servicing to be of secondary importance. These questions are mostly academic unless the diesel-hydraulic demonstrates that it has inherent advantages in hauling traffic. If it can do a better job than the diesel-electric under U.S. operating conditions the other questions can be resolved. Certainly, motive power men with the resourcefulness and know-how to handle the steam-to-diesel-electric conversion will not be hard pressed in meeting maintenance and servicing requirements peculiar to the hydraulic transmission and the unusual truck design.

All are confident that these diesel-hydraulics have been engineered and built to high standards. We are sure they deserve and will get every opportunity to prove their worth under U.S. service conditions that will make it possible to reach a conclusion as to their comparative value.

P&LE 3349

BEFORE





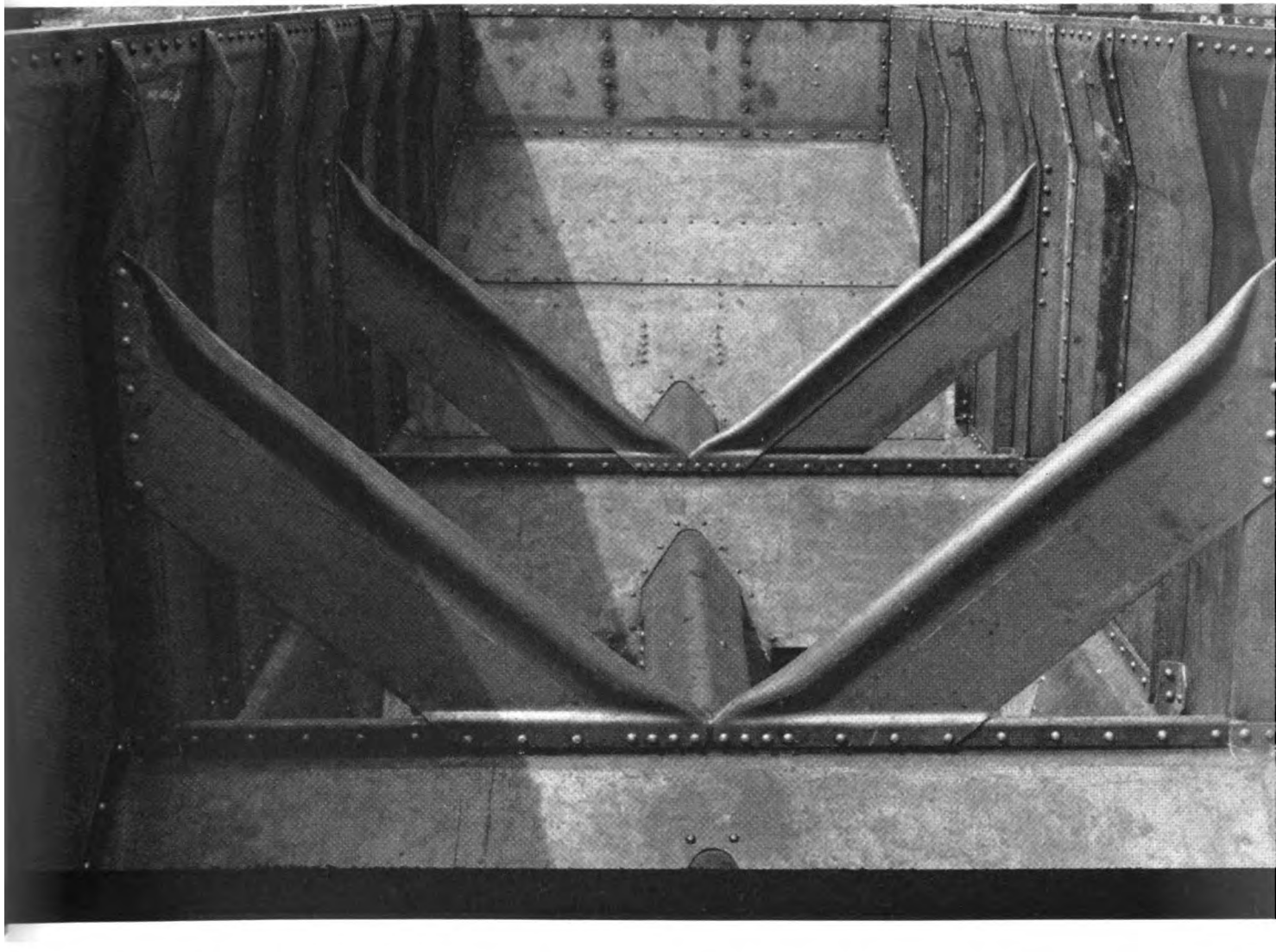
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AFTER



■ The Pittsburgh & Lake Erie Railroad recently completed classified repair of half a thousand 13 year old AAR design open hoppers. These veteran cars had seen a lot of tough coal and ore hauling service. For the most part car structures, except trucks, wheels and parts of the underframes, were fit for scrap. No more.

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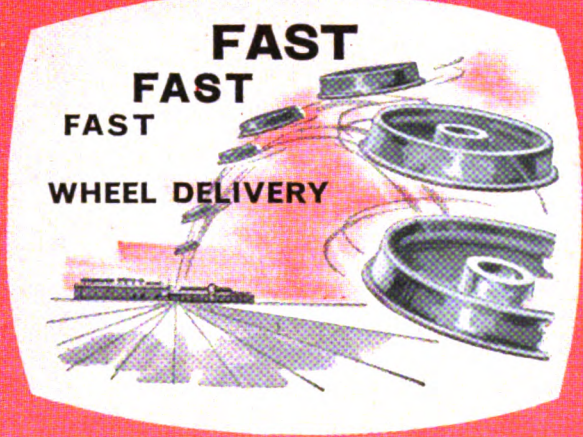
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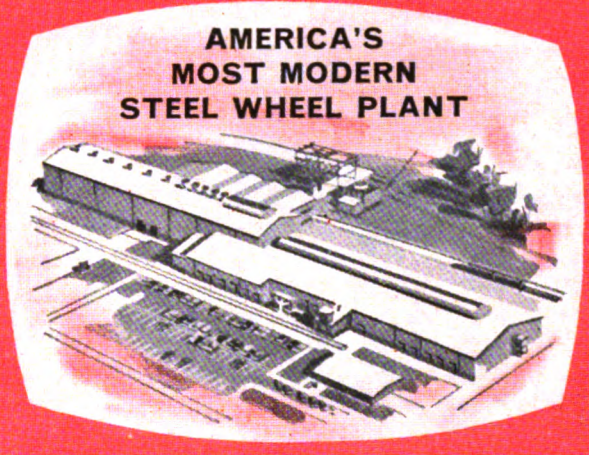
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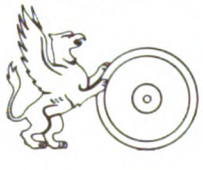
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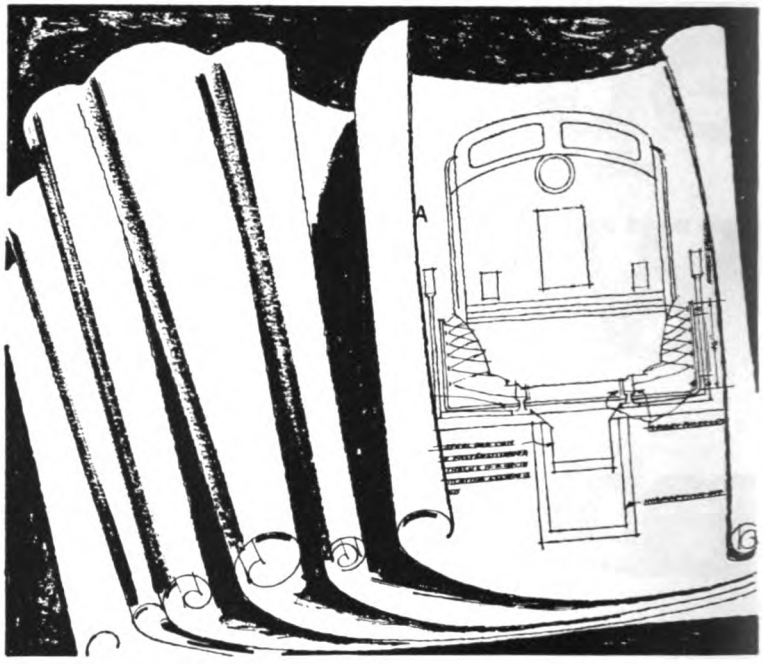
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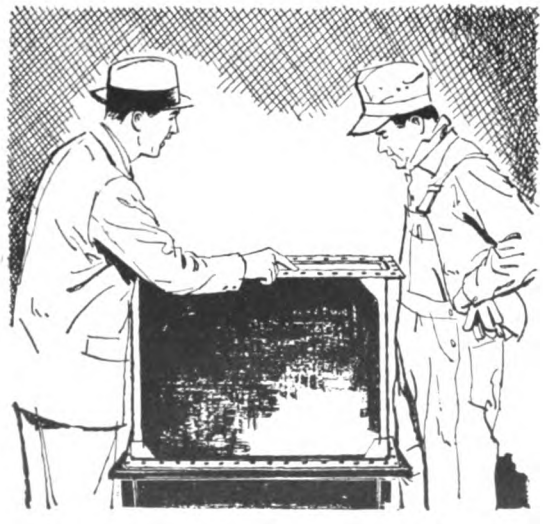
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Diesel-Hydraulics in Service Soon

German-built road freight locomotives are ready for shipment to D&RGW and SP after Austrian road tests

European diesel-hydraulic road-freight locomotives are expected to be running on U.S. rails soon. In a few weeks the six 4,000-hp C-C units ordered by the Denver & Rio Grande Western and the Southern Pacific are to arrive by ship in Houston, Tex., en route from the plant of the builder—Krauss-Maffei of Munich, West Germany.

For the first time in over a half century, U.S. railroads have turned to an overseas manufacturer for motive power. To compare the hydraulic transmission, already extremely popular for high-horsepower European diesel locomotives, with the electric transmission used for high-horsepower applications by U.S. diesel locomotive builders, the two U.S. roads late in 1959, each ordered three of the German-built units.

The units are not duplicates of units already operating on European railroads; they are American-size, American-style locomotives. Each has a rating 1,000 hp higher than any diesel-hydraulic unit now in European service. The locomotives are the first ever fitted with hydrodynamic brake—the diesel-hydraulic equivalent of the electrodynamic brake used on diesel-electric locomotives.

Every phase of design and construction was aimed at producing motive power which could take its place in regular main-line freight service over the rugged routes of the D&RGW and SP. With these units it should be possible to make a reliable comparison of the electric and hydraulic transmissions under U.S. operating and maintenance conditions.

Already the units have been operated experimentally on German and Austrian routes where their acceleration, braking, and tonnage-handling abilities were checked. Observers from the D&RGW and SP were on hand to see the first of the SP units, fourth of the locomotives to come off the K-M production line, go through a series of tests on the Semmering Pass line in Austria.

"During the tests, the locomotives have performed just as we expected them to; what we need now is experience." This comment by Southern Pacific Vice-President W. D. Lamprecht, essentially summed up official reaction of observers to the tests.

All Axles Powered

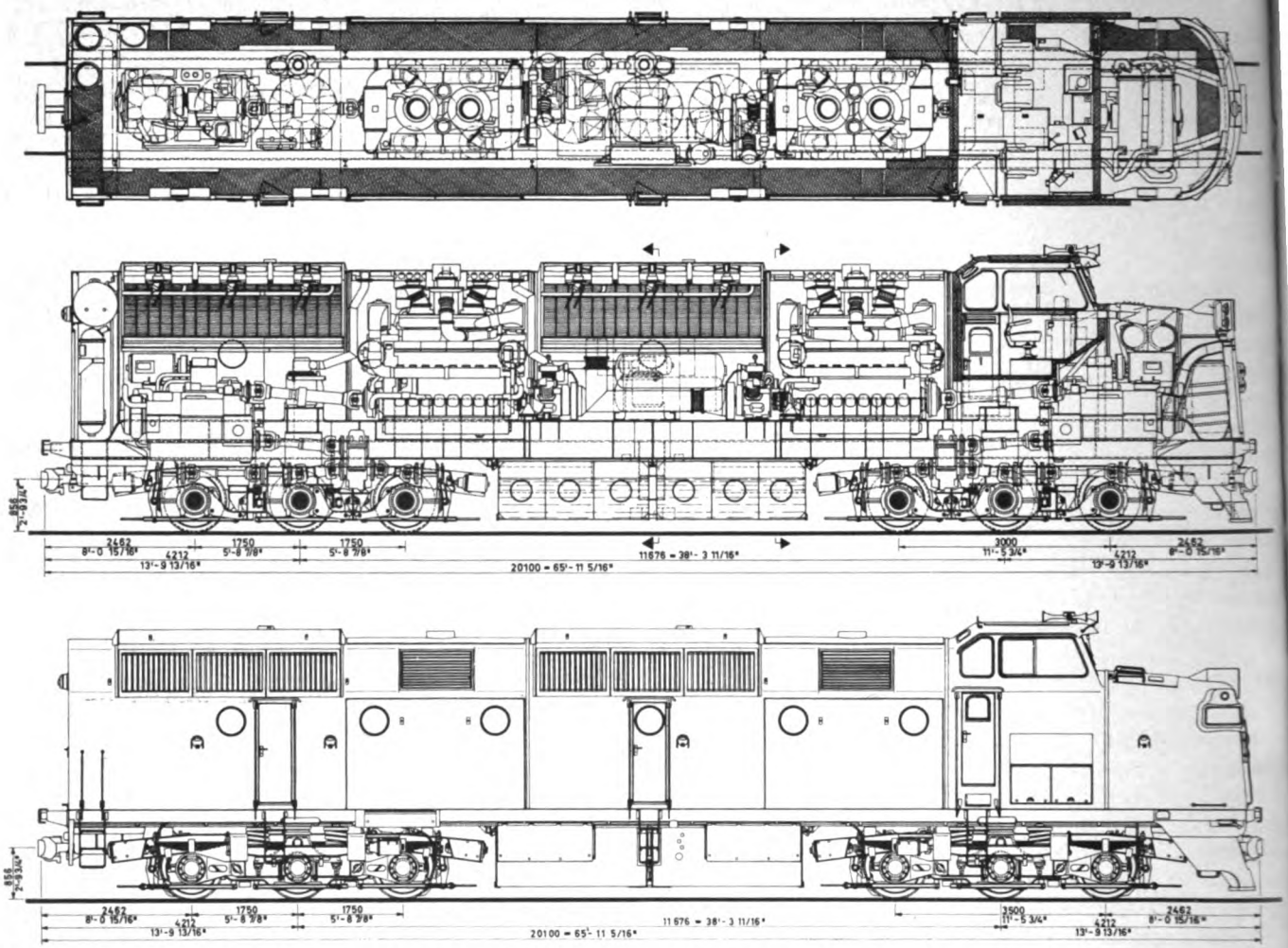
Each 4,000-hp locomotive is an A unit mounted on a pair of three-axle trucks, with each truck individually powered by a 2,000-hp diesel. Length is 65 ft $11\frac{5}{16}$ in. over coupler pulling faces, comparable to the Alco 2,400-hp road-passenger locomotive and about 5 ft shorter than the Electro-Motive 2,400-hp passenger unit. The K-M locomotive weighs 165 tons in working order, just slightly heavier than either of these U.S. locomotives. All axles on the K-M locomotive are powered.

Prime movers for the locomotive are a pair of Maybach MD 870 four-cycle, 16-cylinder engines of the "tunnel" design with disc-shaped crank webs carried in SKF cylindrical roller bearings having outer races mounted on the annular crankcase walls (RL&C, June 1960, p 35).

Each V-16 engine is supercharged and equipped with aftercoolers. The engine has a continuous rating of 2,000 hp at 1,585 rpm under standard International Railway Union (UIC)



Units are equipped for multiple-unit operation. During European tests they were fitted with buffers and continental couplers which are visible on unit shown on the front cover.



Carbody style unit for U.S. service represents departure from road switcher design which has been almost universally used in recent years. Dimensions are indicated in centimeters as well as feet and inches. Overall height of the locomotive is 15 ft 6 3/16 in.

conditions. It weighs 14,200 lb and has the same 7.3-in. bore and 7.9-in. stroke as other Maybach MD engines. Pistons are of the divided type, pressure-oil-cooled through telescoping piping within the engine. A special heat exchanger is provided for piston-cooling oil.

Each engine is started electrically by a starter generator which drives through an elastic coupling and gear step to the input shaft of the Voith transmission and thence to the engine. Two 64-volt lead-acid batteries, each with a 385-amp rating, are charged by the starter generators. This system supplies current not only for starting, but for control circuits, lighting, and auxiliaries. Each engine has an oil-fired preheater which works through the cooling-water system.

There is a V-shaped radiator bank for each engine. Air is pulled through side louvers and exhausted through the roof. The three fans for each radiator are hydrostatically driven. A multi-piston oil pump powers the oil motors which are connected to the fans by V-belts. Fan speed is controlled by pressure in the hydrostatic line which is regulated by the temperature of the cooling water. The main cooling-water circuit passes through the radiator and engine block, and then through the heat exchangers for the transmission oil, hydrodynamic brake, and engine lubricating oil. A secondary water circuit serves the supercharger after-cooler.

Each radiator is fitted with a water-spray system to improve cooling in tunnels where available air has been heated by exhaust gases. Combustion air for the engines passes over plate-type and oil-bath filters after entering the carbody through openings in the side walls.

Hydraulic Transmission

The 4,000-hp unit has fully hydrodynamic transmissions — the Voith Type L8-30rU, with three Fottinger torque converters, built-in reversing gear, and attached hydromatic brake. Each torque converter, consisting of the driving pump impeller, driven turbine runner, and a fixed stator or guide ring, has blading designed for a different speed-torque range. This differs from previous Voith turbo transmissions in which the medium- and high-speed converters were identical, the third stage driving the output shaft through step-up gearing (RL&C, Feb. 1961, p 21).

The Voith hydrodynamic braking system, which attracted much attention during the tests, is based on the principle of the Froude "water brake" in which energy is dissipated in eddy formation and heat. The brake, attached directly to the output of the Voith transmission, consists of a double-entry rotor and a fixed stator with two sets of blading to match the double-entry rotor. The eight braking steps are controlled by filling and emptying the hydraulic circuit. Oil is fed to the brake by the main transmission filling pump through a duplex check valve, the heat exchanger, and the braking valve. Once filled, the duplex valve closes and the oil circu-

lates only through the brake exchanger and brake. Heat generated is dissipated through the heat exchanger to the main engine cooling-water circuit. During braking, the engine's speed automatically steps up to 900 rpm from the normal idling speed of 600 rpm to increase cooling water circulation.

Brake filling is regulated by an eight-step valve which varies the cross-sectional areas of the brake's inlet and outlet, forming a shunt circuit. The brake-control valve is operated by the throttle handle. Because heat dissipation and torque considerations place a limit on the energy the brake can absorb, a limit valve controls brake filling. It also serves as a relief valve, allowing surplus oil to escape when oil pressure within the brake reaches a preset value.

Truck Arrangement

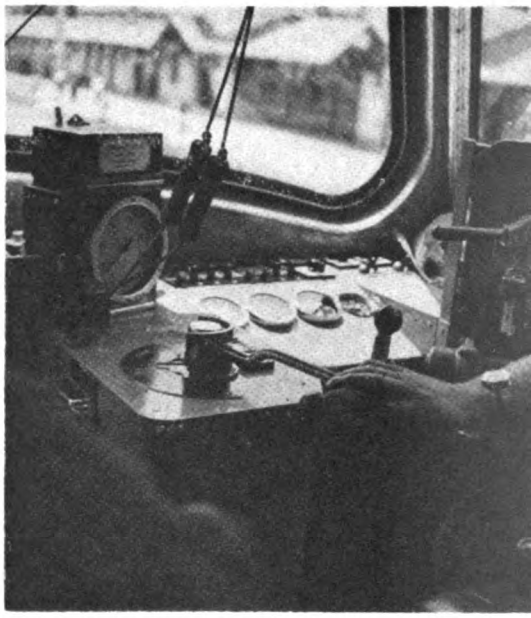
From each transmission, a Cardan shaft extends to an intermediate gear box on the truck frame containing a pair of spur gears and bilateral takeoff underneath. Cardan shafts then drive to Maybach Type C33vl axle drive units. Except for needle bearings in the universal-jointed Cardan shafts, all bearings in the engine and drive are SKF cylindrical roller units.

The trucks are of a special design made necessary by the Cardan-shaft drive. An all-welded, box-type construction, the truck assembly has elastic "Silentbloc" joints wherever possible to cushion shocks. A lever and rod system attached partly to the truck frame and partly to the main frame extension replaces a center pivot, guiding the truck frame around its theoretical center. Longitudinal pulling and braking forces are transmitted from the truck to the main frame through manganese steel liners which bear against the main frame extension.

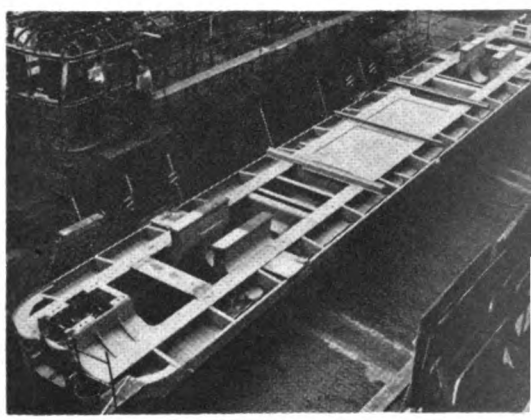
Vertical loads are carried in two steps. The main frame rests, through rubber bolsters, on four cross-members which are suspended in turn from the cantilevers of the truck frames by spring tensioning screws and helical springs. The truck suspension is relatively soft, while the direct springing between the journal boxes and truck frames has a higher rigidity. The design of the springing is intended to prevent excess rolling.

Underframe specifications for the SP and D&RGW units call for a million-pound buffing strength at the drawbars. Because of the hydraulic transmission and shafts, there are no conventional center sills. The welded underframe consists of two widely-spaced sills, continuous wide-flange I-beams, connected at the bolsters and under the engines by heavy built-up crossbearers. End members are cast-steel pieces incorporating coupler pockets.

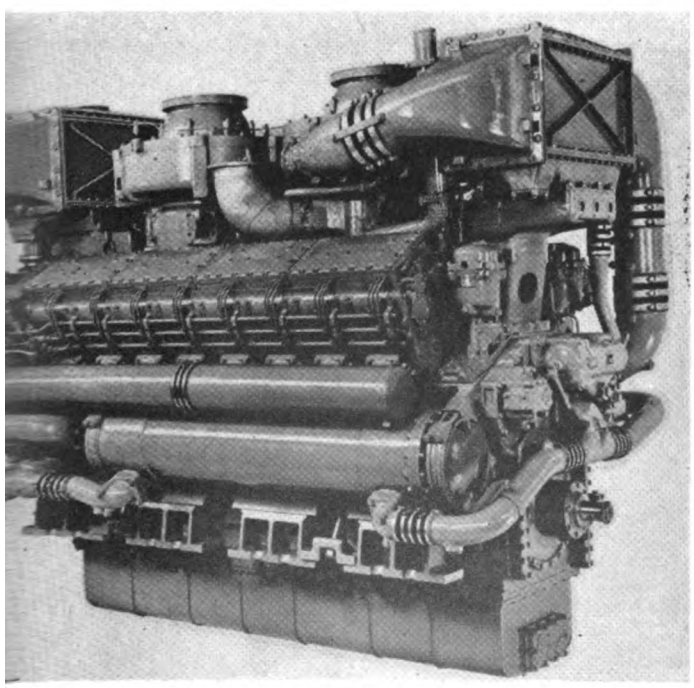
A finished frame was subjected to the specified 500-ton compressive load. In spite of distortion of several



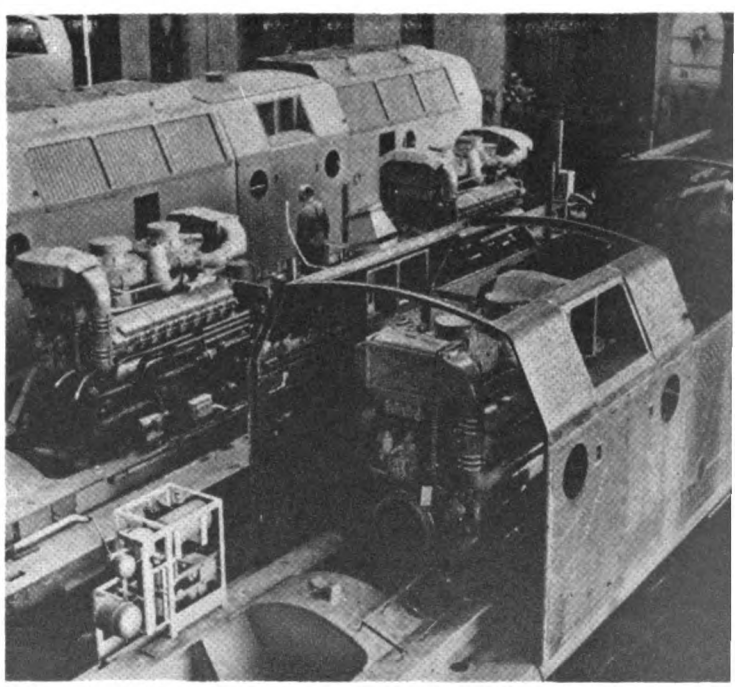
Main controller in the cab operates the diesel engines and hydrodynamic brake.



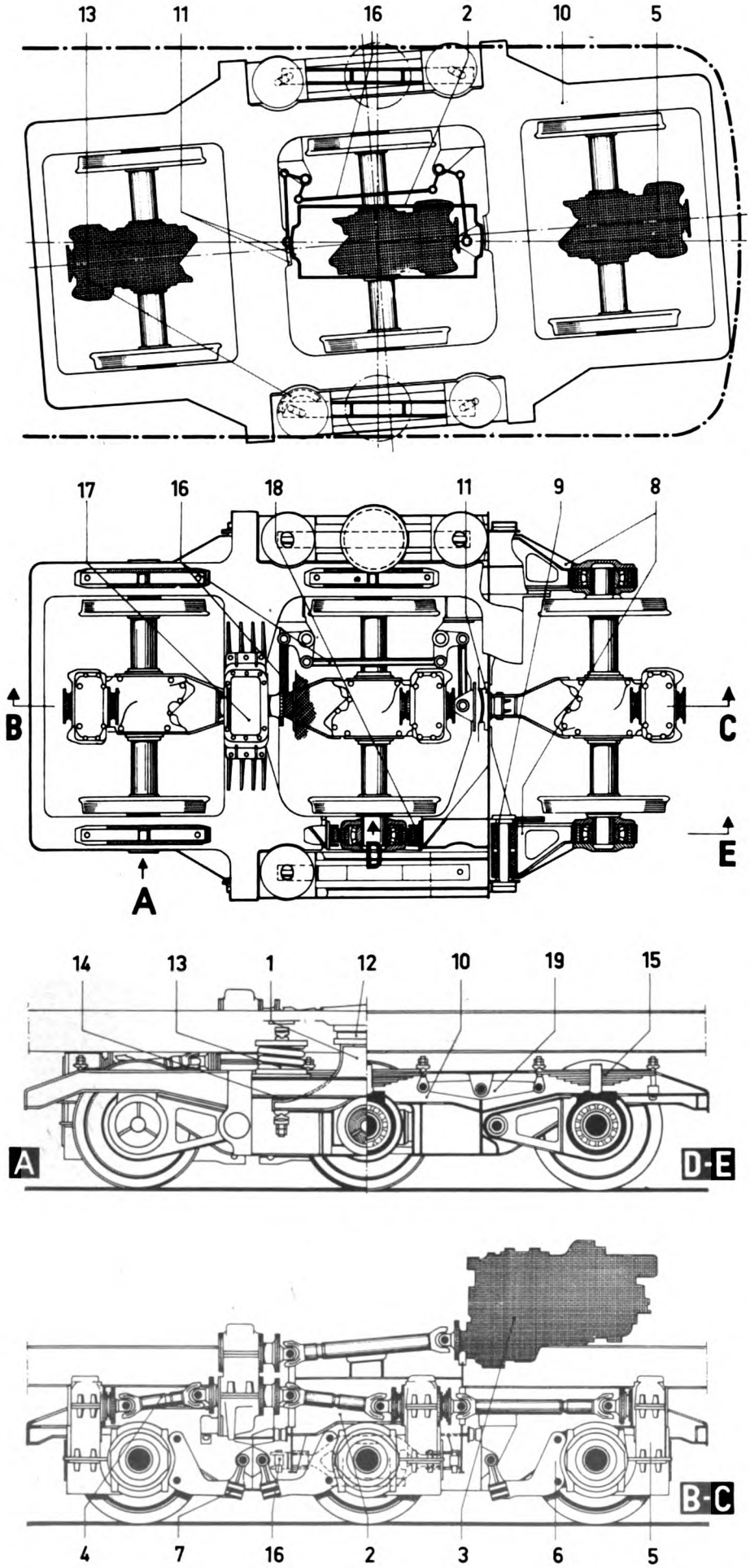
Inverted main frame shows extensions that extend down into the truck frames.



Brake mean effective pressure is 198 psi and specific fuel consumption is 0.380 lb per hr. Engine weight is 6.6 lb per bhp.



Carbody profile fits European clearances. Engines and transmissions are mounted on main frame, driving trucks through shafts.



inches at the frame center, lasting distortion was less than 1/64 in. The frames carry AAR Type E bottom-operated couplers with draft gear of the National M-380 type.

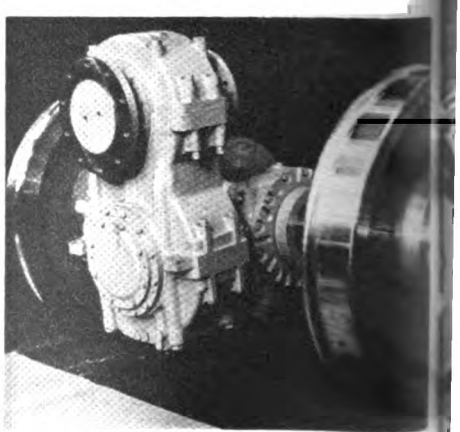
Carbody Design

Most European feature of the carbody is the pronounced inward slope of the upper portion of the cab and sides made necessary for testing under European clearance conditions. The engine-room roof is slightly lower than the cab roof, chiefly to provide extra space for exhaust stacks so that a lower temperature air can be taken in for cooling and combustion under close tunnel conditions.

The carbody consists of four separate sections: nose, cab, and two engine-room sections. Nose and engine-room sections are solidly bolted to the frame. The cab rests on rubber cones. The four sections are insulated and weatherproofed by rubber seals at the joints. All four sections consist of steel framing on which the outer walls are spot-welded. Inner sides of the engine-room walls are covered with sprayed-

Truck Components

1. Cross-member between springs
2. Main frame extension
3. Hydraulic transmission
4. Cardan shaft
5. Axle gear drive unit
6. Torque support
7. Torque support suspension element
8. Axle guide pendulum link
9. Silentbloc for axle guide pendulum link
10. Truck frame
11. Steel liner
12. Rubber bolster
13. Helical secondary spring
14. Spring tensioning screw
15. Laminated primary axle spring
16. Guide linkage
17. Distributing gear case
18. Pedestal liner
19. Equalizer



Axle drive unit is powered by Cardan shaft from distributing gear on the truck frame.

on acoustical material. The cab is double-walled, the space between outer walls and perforated metal inner sheeting being filled with stone wool. This acoustical treatment, combined with the rubber-cushioned mounting, results in a quiet cab interior.

Roof hatches are provided for removal of the engines, front starter generator, and the Cardan shaft passing under the cab floor. The two complete radiator sections in the engine-room roof are removable as units. The rear hydraulic transmission can be removed through the opening resulting from removal of the rear radiator. The nose section must be removed to remove the forward transmission. Between the trucks is a 3,280-gal fuel tank. Fuel level is indicated with Liquidometer gages.

The locomotive is equipped with a Westinghouse 26L air-brake system. The two Wabco three-cylinder 3CDCB compressors each having an output of 225 cfm at 1,000 rpm, feed the two main air reservoirs which have a total capacity of 48,820 cu in. Each engine drives one of the compressors through a V-belt drive. The air system also supplies the pneumatic control equipment and air-operated auxiliaries. All wheels are fitted with clasp brakes, with individual cylinders for each wheel. A hand brake on the rear cab wall acts on one wheel of the front truck only.

Four sandboxes, welded to the inner engine-room walls and filled through outside hatches, supply Prime sanders discharging under the leading wheels of each truck. Controls provide automatic sanding when wheels slip.

Other equipment includes a three-chime Nathan air horn; Mars light; Pyle-national dual sealed-beam headlights; markers, and illuminated train-number boards; and an air-operated Magnus bell.

Cab controls are simple and conventionally arranged. The brake stand is on the right, and the controller and reverser at the engineman's left. A panel directly ahead contains the brake and control gages, as well as warning lamps and electrical switches. To the engineman's left is a recording speed indicator. D&RGW units have Chicago Pneumatic recorders; SP units, Barco.

Master Controller

The master controller regulates both power and braking. The "drive" side of the controller has 17 steps. At Step 1 ("partial filling"), the first stages of the converters are partially filled, permitting slow and carefully controlled movements when operating light. At Step 2, the starting converters are filled to normal level ready for operation, while the engine continues to idle at 600 rpm. Steps 3 through 17 gradually increase engine output up to full power. Transition between converter stages is fully automatic, depending on controller position (engine speed) and track speed. On the opposite side of the controller from the drive steps are the eight steps of hydrodynamic brake control.

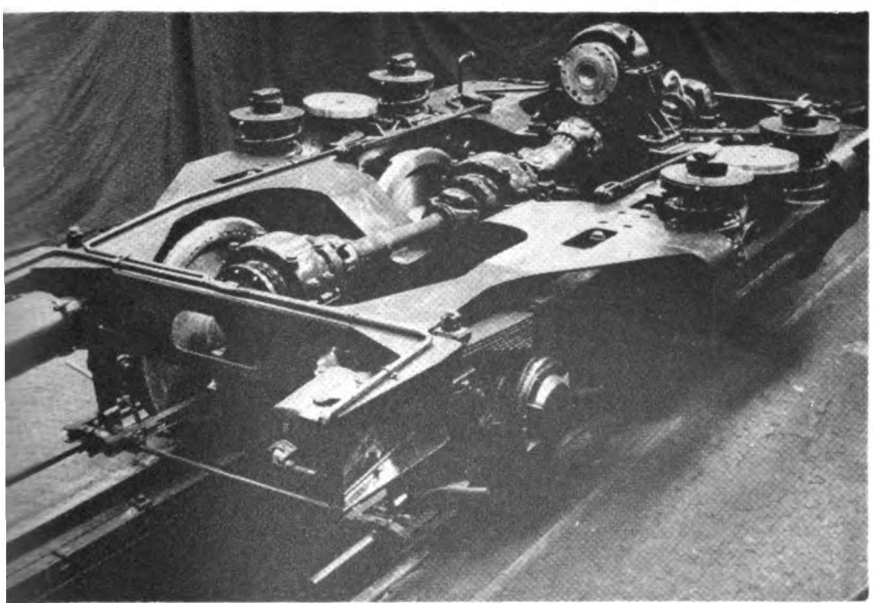
Actual control impulses for the drive, braking, and reverse gear are transmitted by a pneumatic control system. The components are on a rack within the nose section. In addition to the direct controls, pneumatic safety circuits are provided, including overload protection which interlocks the engine controls and air brakes to prevent engines being brought to full output while braking. The reverser is interlocked so that it can be operated only with the locomotive at a standstill. There are also full electro-pneumatic multiple-unit controls with Joy jumper connections.

During the Austrian tests in July, the first of the SP units made five round trips over the Semmering Pass line's 2.5% grades hauling scheduled freight trains of the Austrian Federal Railways. The Semmering route is much like the lines over which the locomotives will operate in the U.S. The uncompensated ruling grade of 2.52% on the 19-mile north slope was the main testing ground for both pulling and braking power.

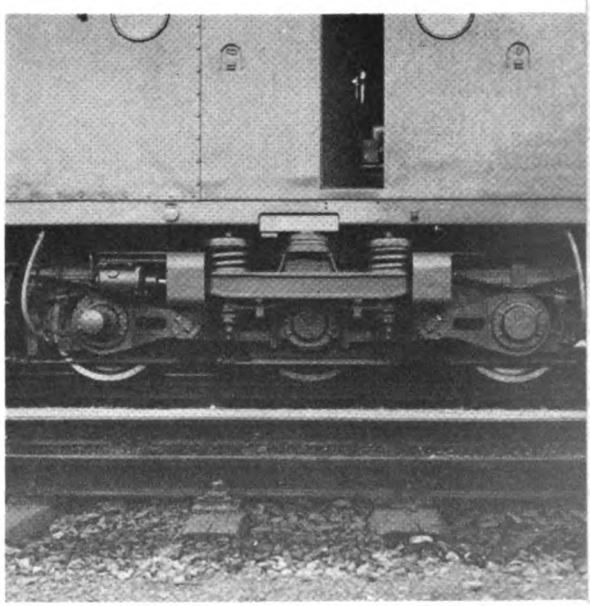
Advance calculations for single-unit performance with a 965-ton train of European cars were either met or exceeded during the week-long tests. Austrian axle-loading limitations meant that the locomotive—with a design weight in working order of 165 tons—was held to 152 tons by carrying only about 660 gal. of fuel in its 3,280-gal. tank.

Trains hauled in each of the ten tests averaged about 950 tons, composed almost entirely of two-axle cars. Differences in car design—side buff-

(Continued on page 75)



Carbody is supported through rubber bolsters at sides of truck frame. Spring suspension is designed to minimize rolling of the body.



Outer axles are pivoted on truck frame; center axle is guided in pedestals.

GATC Builds Propane-Fueled Reefers

Mechanical refrigerator cars for meat service are equipped with package refrigeration units which simplify maintenance

Mechanical refrigerator cars designed specifically for hauling fresh meat and other packing-house products, are being built by General American for lease to four packing companies. Discussing the 210 reefers which his company will build, GATC President Spencer D. Moseley recently stated, "The new model offers a better unit for special use of the packer and is markedly more economical than the all-purpose car."

A propane-fueled mechanical refrigeration system maintains temperatures at any setting between 26 and 70 deg F, depending on the product to be shipped. This is the first large group of cars to be built with polystyrene foam insulation panels throughout. Foam plastic was first used by GATC in an experimental car in 1947 and was again utilized in 35 cars built in 1949. It is said to reduce heat loss to approximately half that of conventional cars, allowing use of a more economical refrigerating unit. Cooling equipment for the cars now under construction is being built by Thermo-King to General American specifications.

The unit is powered by a two-cylinder, spark-ignition, air-cooled Onan engine. Compressor, condenser and evaporator are belt-driven from the engine shaft. The engine's 8-qt crankcase usually makes it unnecessary to add oil while car is en route. Oil consumption is approximately 1 qt per 100 hr. A straight, non-detergent No. 20 oil is used year around.

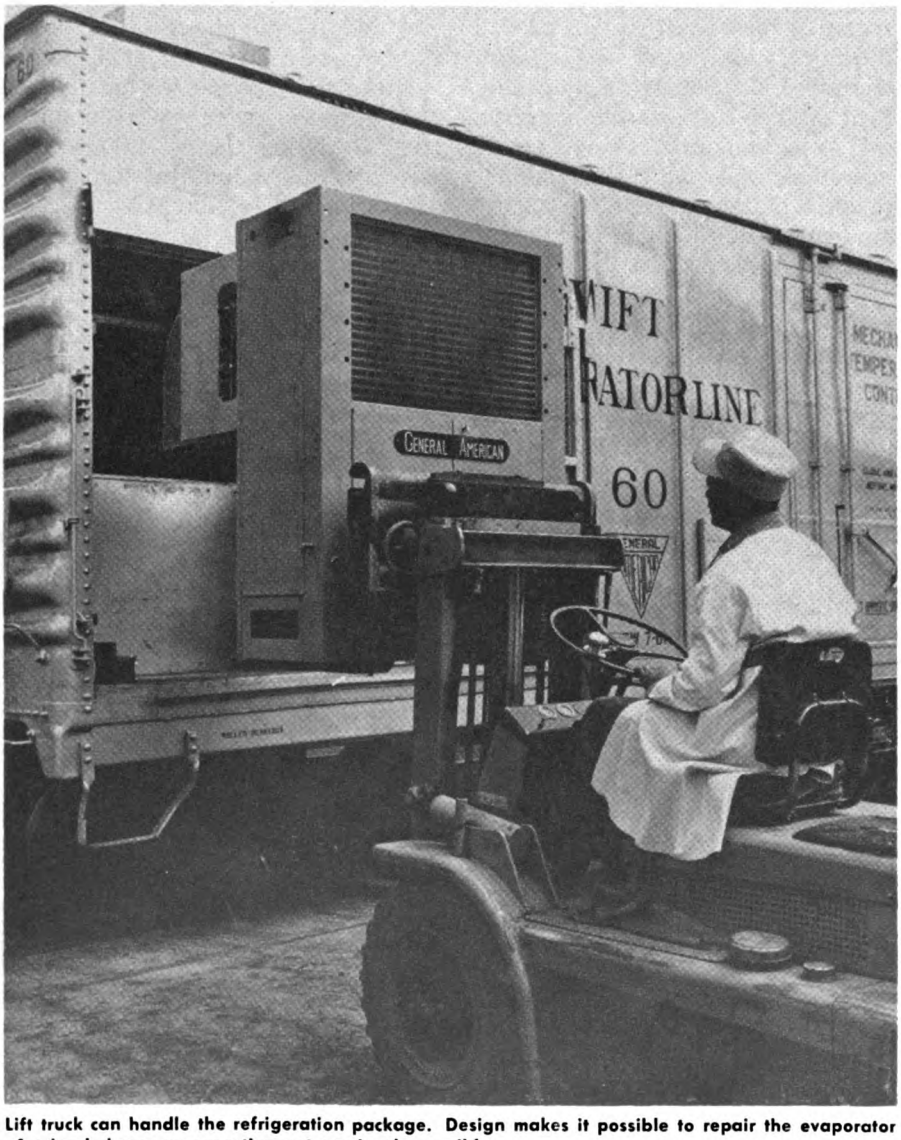
In this car, the engine and condensing and evaporator units are combined into one package which can be removed by a fork lift and replaced in less than one-half hour. The power section, consisting of the engine, compressor, condenser, and controls, is outside the insulated portion of the car. The refrigeration unit includes the evaporator and fan, expansion valve, blower, heat exchanger, and controls. This section fits into a plenum through which air passes at relatively low velocity, being cooled as it returns from the top of the car and before it is delivered below the floor racks. All cooling-unit servicing can be done without entering the load compartment. In the conventional car, evaporator repairs cannot be made when a car is loaded.

The underframe is the Waugh 70,000 ft-lb, 10-in. travel type. The 40-ton Barber S-2-C trucks have $3^{11}/_{16}$-in. spring travel and are fitted with Timken roller bearings. Single wear cast-steel wheels are mounted on 5- x 9-in. axles. The Standard panel roof is assembled and fastened in place with cold rivets.

The foamed polystyrene insulation is bonded to plywood, forming rigid panels 6 in. thick. The ceiling, floor, one of the ends, and the sides from doors to ends are all one-piece panels. A 2-in. thickness of fiber glass is added between the ceiling panel and the roof. Plug door insulation is 4½ in. thick. There are no wood floor stringers, belt rails, carlines, compression points, or nailers. Huck bolts through the flanges of the exterior side posts hold the side panels in place. The coefficient of heat transfer (U factor) is approximately 88 Btu per hr per deg.

Hickory-pecan faced plywood is used for the flue liners on the sides and

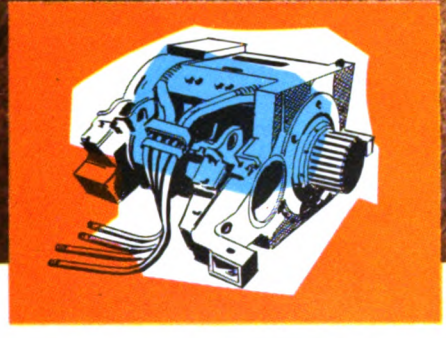
(Continued on page 31)



Lift truck can handle the refrigeration package. Design makes it possible to repair the evaporator of a loaded car, an operation not previously possible.

THE SOUTHERN PACIFIC'S FAST FREIGHTS MEET EXACTING SCHEDULES WITH AN ASSIST FROM NATIONAL BRUSHES

TRADE-MARK



Because of the Southern Pacific's fast-freight service, industrial customers served by this 14,900-mile rail network are permitted to maintain smooth production schedules with a minimum of inventory.

The close scheduling involved requires rugged and reliable service from fast freight diesel locomotives.

"National" traction motor brushes—wherever used on the Southern Pacific's 2,000 diesels—offer dependable commutation and life . . . and help keep motive power in service by reducing maintenance.

To meet today's constantly changing and more difficult electrical conditions, National Carbon Company contributes to improved railroading through a positive carbon brush service program. To realize this assistance, just call your "National" Brush Man or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. In Canada: Union Carbide Canada Limited, Toronto.

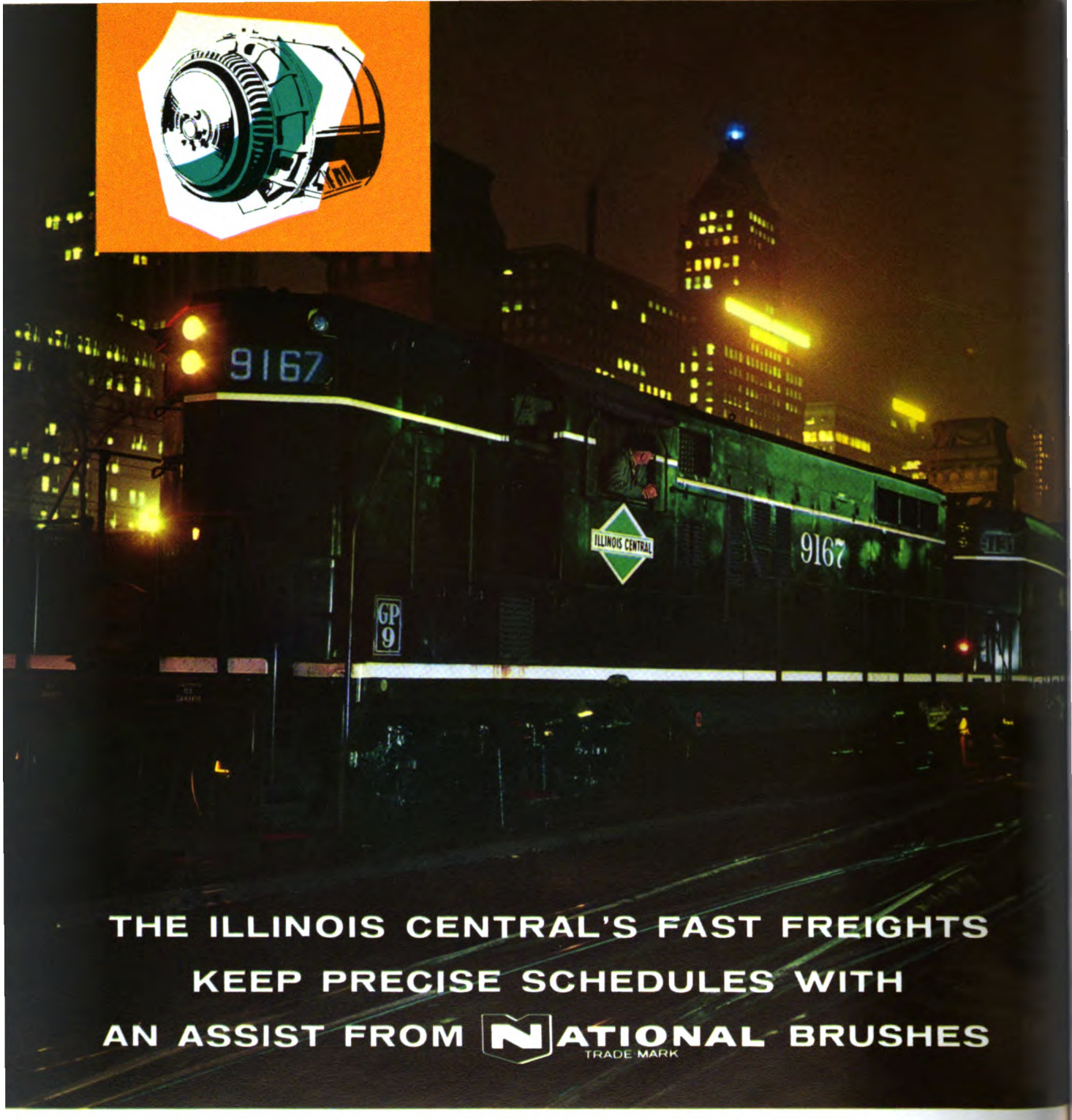


Contact your "National" Brush Man

UNION CARBIDE

"National" and "Union Carbide" are registered trade-marks for products of

NATIONAL CARBON COMPANY



THE ILLINOIS CENTRAL'S FAST FREIGHTS KEEP PRECISE SCHEDULES WITH AN ASSIST FROM NATIONAL BRUSHES

TRADE MARK

Modern railroads like the Illinois Central are using fast freights to bring improved service to their customers. Programs of this nature require trouble-free motive power with minimum lost-time for maintenance.

All the components in the locomotive, no matter how large or small, must offer rugged, dependable service to assure that these complex schedules will be met.

"National" generator brushes—small but vital components—offer proved commutation and life, and operate with the reliability so necessary for today's progressive railroad service.

National Carbon Company offers a positive carbon brush service program to help America's railroads provide improved freight delivery. To realize this assistance, just call your "National" Brush Man, or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. In Canada: Union Carbide Canada Limited, Toronto.



Contact your "National" Brush Man

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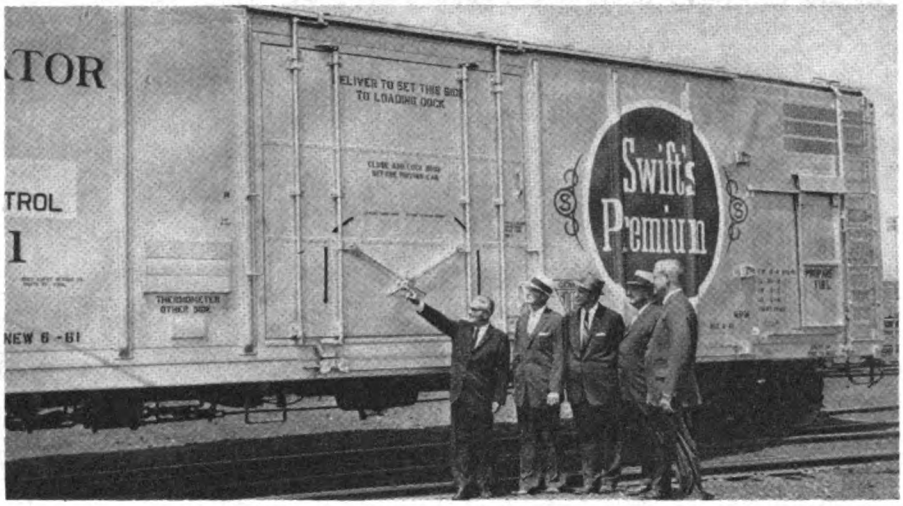
(Continued from page 28)

ends. Floor racks are solid and form a flue over the floor for the full length of the car. A plastic pipe floor drain with a rubber plug in each corner drains water from the car when the interior is being washed.

The 155-gal fuel tank holds 660 lb of propane. When the tank is completely filled, the unit will operate eight to twelve days, depending on the initial load temperature. Fuel consumption is a little more than 2 lb per hr under normal operating conditions. Refueling en route is not required.

The main panel includes a push-button starter switch, ignition reset switches, engine hour clock, ammeter, and manual defrost switch. All electrical controls are in a sealed box, except for the thermostat, and can be removed as a unit. The thermostat control is mounted to the right of the main control panel. After starting, the unit maintains the required car temperature through fully automatic temperature control. The engine operates at high speed until a point 2 deg F above the desired temperature is reached, at which time it is throttled back to low speed. When operating on the road, the unit will alternate between heating and cooling cycles at a constant low speed, except during defrost periods.

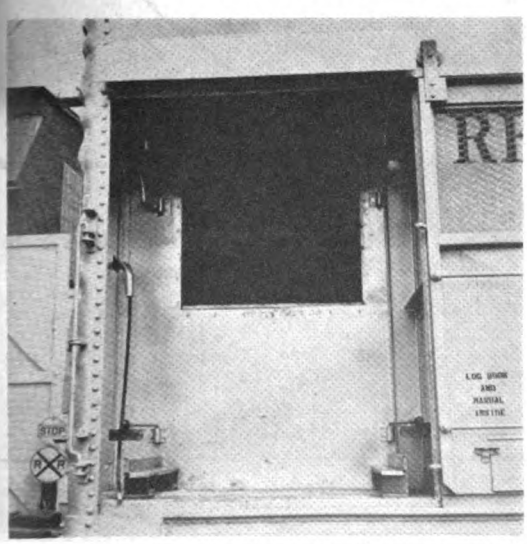
An automatic defrost cycle takes place at high engine speed every four hours. The cycle continues until the coil is free of ice, at which time the defrost cycle is automatically ended. A manual defrost switch will initiate a defrost cycle when depressed. During defrost, the exaporator fan clutch is disengaged, stopping air circulation across the evaporator coil. The compressor is belt-driven from the engine crankshaft. The evaporator and condenser fans are mounted on one shaft and are also belt-driven from the engine crankshaft.



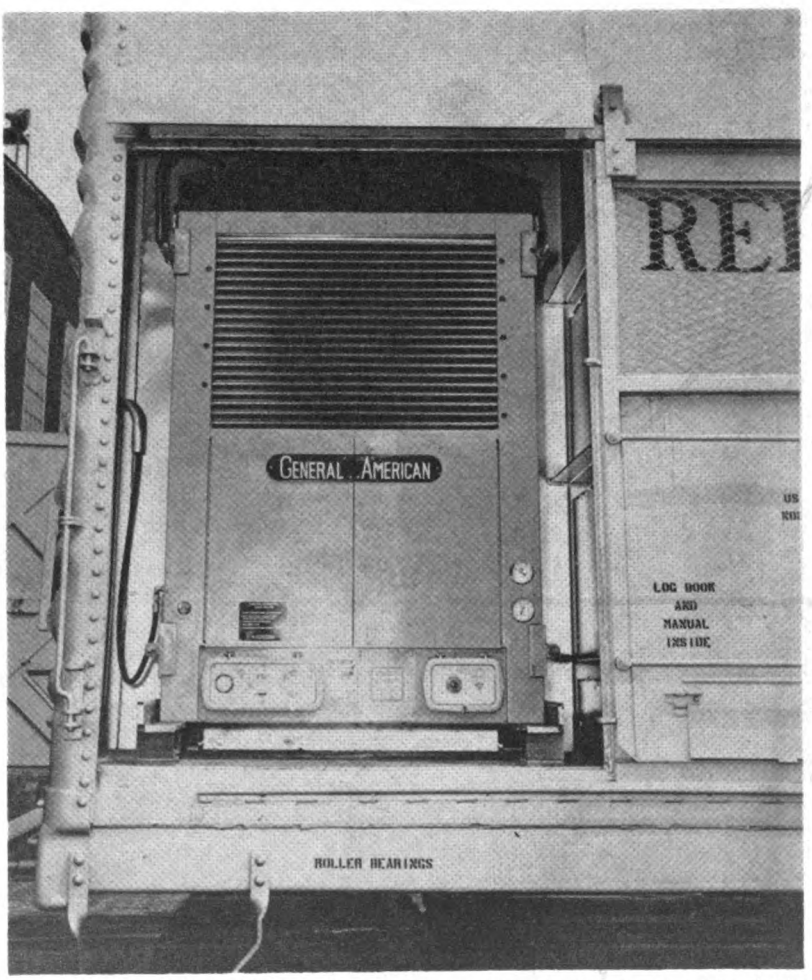
Exterior side posts on new GATC car make possible a greater inside width. Lading space is insulated throughout with a layer of polystyrene foam.



Four holding clamps swing clear of cabinet when loosened; design aims to speed removal and installation.



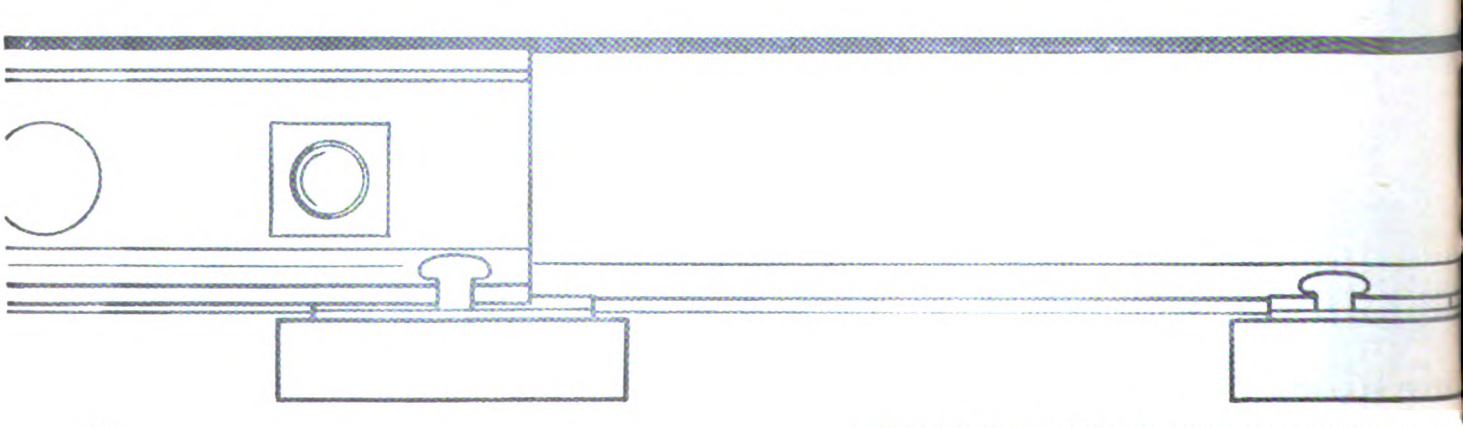
Evaporator fits through hole in rear of compartment. It extends into plenum through which air is circulated.



Removal or installation of refrigeration package requires 7 to 10 min. Gas line (lower left) and exhaust (upper left) are only connections to be made.

STOP HOTBOX DELAYS

that result from Incorrect Lubrication



USE SINCO® CAR OIL

Premium Grade from

SINCLAIR

Compounded from natural high quality 100 plus V.I. oils, Sinco Car Oil gives you these advantages:

- ☆ All-weather protection – will not congeal in cold weather, nor thin out in heat.
- ☆ More rapid flow through waste or pad – provides instant lubrication.
- ☆ Anti-rust and oxidation-inhibited.

For additional information, write or call Sinclair Refining Company, Railway Sales, 600 Fifth Avenue, New York 20, N.Y.
New York • Chicago • St. Louis • Houston

Sinclair
Railroad Lubricants

Sinclair

3 SIMPLE STEPS TO REDUCE YOUR HOT BOX PROBLEMS

Any one of these steps will contribute to relief from the hot box problem . . . will help improve journal bearing performance and cut operating costs, too. Together, the indication is so promising that the feasibility of a 48-month repack period is now being tested.

Want proof? Try these quality Brake Shoe products to upgrade the bearing performance of your cars—see for yourself what they can do when the going is rough. For full details consult American Brake Shoe Company, Railroad Products Division, 530 Fifth Avenue, New York 36, New York.

A-1897

AMERICAN Brake Shoe COMPANY

Quality products cut your ton-mile costs.

1 Keep oil in box. New Absco dust guard helps keep oil in, dirt and water out. Engineered for long life. Fills the well . . . doesn't drop down onto journal when axle shifts laterally, doesn't get damaged when axle moves back. Yet it can follow under severe impact or misalignment.

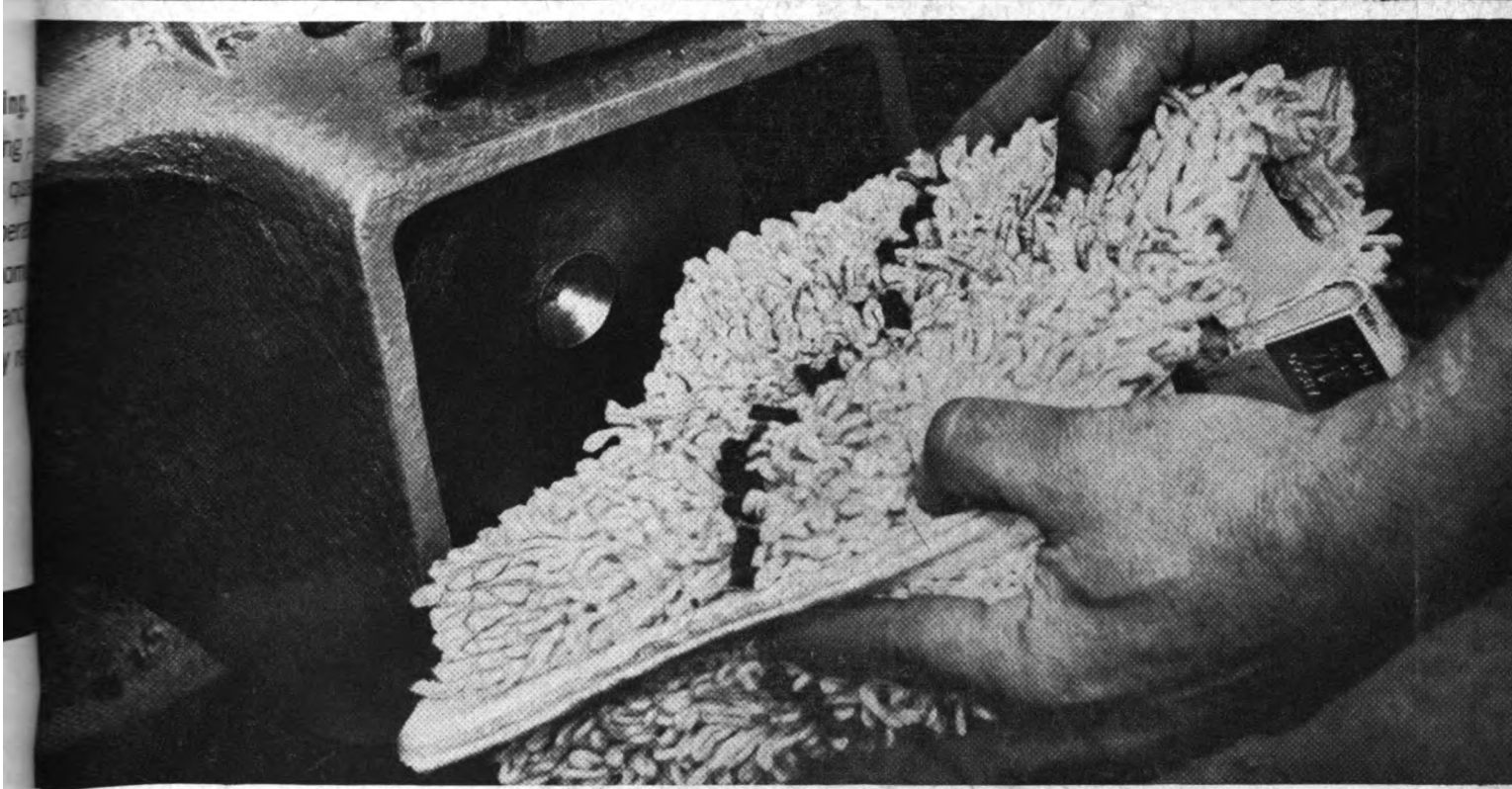
2 Feed oil to bearing. Improved Absco lubricating pad* holds and feeds ample quantities of oil under all operating conditions. Simple, economical, durable, easy to install and remove. Can be effectively renovated for long life.

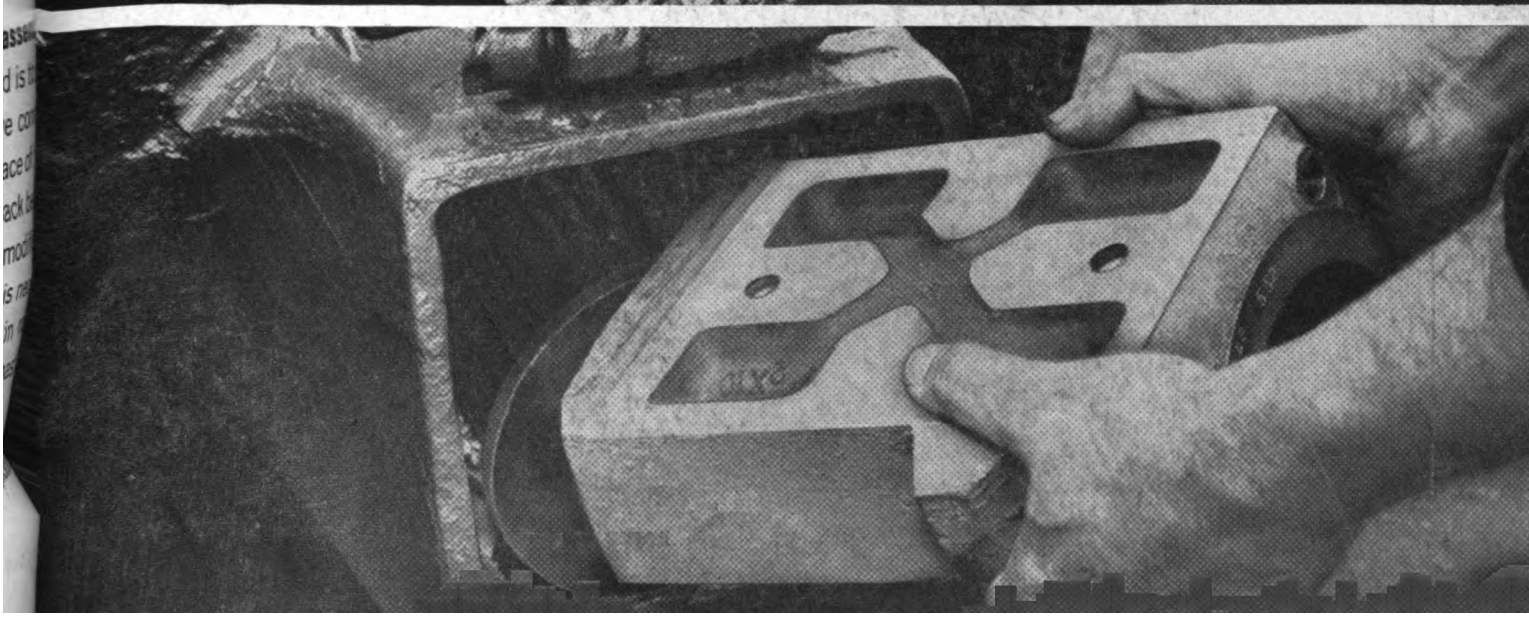
*A.A.R. conditionally approved.

3 Stabilize journal assembly. A quick, simple method is to install the Absco positive control flat back bearing† in place of the conventional steeple back bearing. No alteration or modification to the box or axle is necessary. Proved effective in road tests extending over the past 36 months.

†A.A.R. approved for limited application for test in interchange service.


ABSCO GUARD 6 1/2 X 10






new MAGPAD* with NALU



a low-cost lubricator that also has internal wicking and lock-stitched tufted cover

The heart of the new MAGPAD is NALUR — a specially formulated acrylonitrile foam rubber developed and produced by National Lead Company. It is highly resilient, has low oil swell characteristics and excellent resistance to compression set at high temperatures.

Outer cover is a heavy high-quality chenille, lock-stitched to withstand a 10-lb. minimum pull on tufts. End closures are tough cotton belting.

Ample internal wicking is provided by 25-ply candlewick routed through ½" vertical orifices to provide unrestricted flow of oil.

Renovation—The MAGPAD with NALUR is sturdily made —its rugged construction permits renovation by any standard method in railroad use.

Get the full story on the new *low-cost* MAGPAD with NALUR. Ask our representative or write for details. Magnus Metal Corporation, 111 Broadway, New York 6, New York or 80 E. Jackson Blvd., Chicago 4, Illinois.

MAGNUS

METAL CORPORATION

Subsidiary of

NATIONAL LEAD COMPANY

GEARED TO PROGRESS
RPI
MEMBER

Programs – Coordinated Mechanical Associations

Air Brake Association—*Crystal Room*

Monday, September 11

10 a.m.

President's address.

Address—E. P. Gangewere, president, Reading Co.

Air Brake Suppression of Locomotive Accelerated Slips—Ralph C. Ross, project engineer, New York Air Brake Co.

Techniques of Air Brake Maintenance—Pittsburgh Air Brake Club

2 p.m.

Train Yard Air Brake Problems and Their Remedies—St. Louis Air Brake Club

Air Compressor Lubrication—K. Reyea, research and development engineer, Texaco

Wabcopac Brake Units for Freight cars, —W. B. Kirk, chief engineer, Westinghouse Air Brake Co.

Metropolitan Commuter Train Brake Equipment—Manhattan Air Brake Club

Tuesday, September 12

8:30 a.m.

Joint meeting with Locomotive Maintenance Officers Association. Subject: Effect of New Type Brake Shoes on Locomotive Maintenance Operation

Calculated Tonnage per Operative Brake in Grade Service—Central Air Brake Club

Methods of Dynamic Interlock Application—H. N. MacPherson, supervisor air brakes, Canadian Pacific

Methods and Materials in Air Brake Pipe Joints—Dresser Manufacturing Div., Dresser Industries Inc.

Wednesday, September 13

9 a.m.

Automatic Train Operation—Montreal Air Brake Club

Oerlikon Vigilance and Safety Control—D. A. Wagner, air brake instructor, B&O

Election of officers

Question box

1 p.m.

Reports of committees

Car Department Officers—*Louis XVI Room*

Monday, September 11

10 a.m.

President's address

Report—AAR Loading Rules

Address—Spencer D. Moseley, president, General American Transportation Corp.

2 p.m.

Report—Road-Rail Transportation

Address—C. M. Roddewig, president, Association of Western Railroads

Report—Interchange and Billing for Car Repairs

Report—Design, Maintenance, and Upgrading Freight-Car Equipment

Tuesday, September 12

9 a.m.

Report—Light Repair Track and Train Yard Operation

Report—Car Lubrication. Comments—W. M. Keller, vice-president (research), AAR

Wednesday, September 13

9 a.m.

Report—Wheels, Axles, and Wheel Shop Practices. Moving picture, "It Can't Be Done," showing Southern Railway's automated shop wheel at Knoxville, Tenn. Courtesy Farrel-Birmingham Co.

Report—Passenger-Car Maintenance

Report—Maintenance and Servicing of Mechanical Refrigerator Cars and TOFC Trailers

Report—Painting

1 p.m.

Miscellaneous reports

Election of officers

Locomotive Maintenance Officers—*Grand Ballroom*

Monday, September 11

10:30 a.m.

Address—C. N. Wiggins, Jr., assistant general manager, Louisville & Nashville

Diesel Engine Maintenance. Topic: New economical methods that improve service life of diesel engines

2 p.m.

Steam Generator and Water Treatment. Topic 1: New simplified control for steam generators. Topic 2: Steam generator rifled-tube performance

Shop Equipment. Topic: Modern equipment and methods for spot maintenance and inspection of locomotives

Tuesday, September 12

8:30 a.m.

Diesel Mechanical—Other. Topic: Effect of new type brake shoes on locomotive maintenance and operation

Address—Edwin Butler, assistant director of locomotive inspection, Bureau Safety and Service, ICC

Diesel Material Reconditioning and Control. Topic: Latest practices in economical reclamation of locomotive parts

Wednesday, September 13

8:30 a.m.

Diesel Electrical Maintenance. Topic 1: New ideas in maintenance and rebuilding of traction motors and main generators. Topic 2: Upgrading control equipment

Fuel and Lube Oil. Topic 1: Lube and fuel oil filtration. Topic 2: Engine sparking

1:30 p.m.

New Developments in Motive Power Maintenance. Topic: Mechanical department production control systems, or any other recent maintenance developments

Railway Fuel and Operating Officers—*Bal Tabarin*

Monday, September 11

10 a.m.

President's address

Address—J. C. Kenefick, general manager transportation, New York Central

Panel discussion on Loss and Damage Prevention

Address—V. C. White, director of supervisory training, Frisco

2 p.m.

Safety—E. H. Hallmann, director of personnel, Illinois Central

Panel discussion on Train Handling

Panel discussion on Instructions on Handling of Trains with 24RL and 26L

Tuesday, September 12

9 a.m.

Discussion on Duties and Responsibilities of Road Foreman

Panel discussion on Economy in Use of Fuel oil

Economical Utilization of Power—C. M. Machin, Jr., manager motive power operation, Baltimore & Ohio

Panel discussion on Terminal Delays and Yard Operation

New Electric Motive Power E-44—J. S. Lotz, assistant road foreman, Pennsylvania

Wednesday, September 13

9 a.m.

EMD Advance Horsepower— V. E. Rennix, general sales manager, EMD

Panel discussion on Diesel Failures, Causes and Remedies

2 p.m.

Official business

Open discussion

MAKE A NOTE
OF THIS

important name change—

Texaco Car Oil 1960 HD is now

TEXACO JOURNALTEX HD

Only the name has changed, to make it more descriptive. For specific examples of how Texaco Journaltex HD can help you reduce hotbox setoffs,

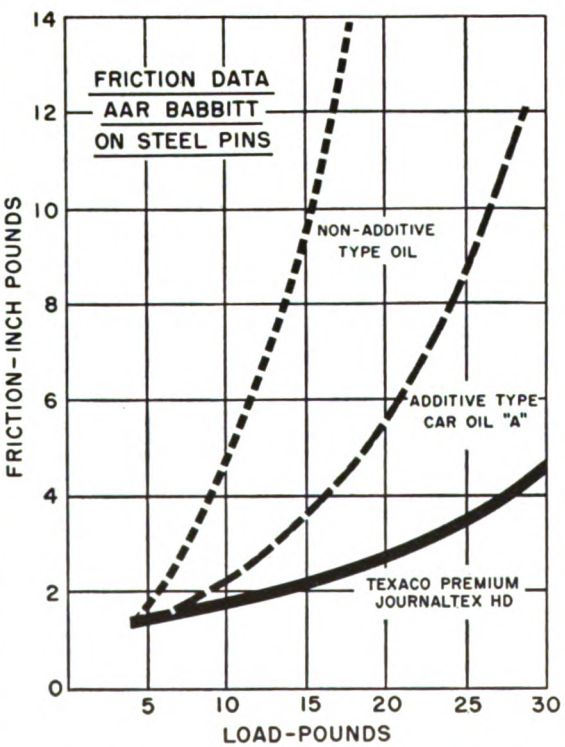
turn the page . . .

PREMIUM OR NON-ADDITIVE TYPE OIL? ***Premium Texaco***

Three reasons why new can help reduce hot

60% less friction

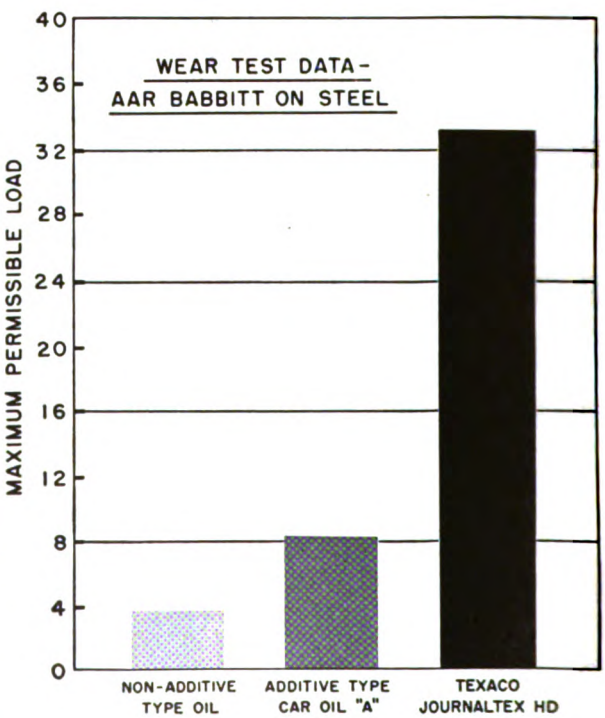
Less friction means lower operating temperatures . . . an important reason why Texaco Journaltex HD can help cut hot boxes as much as 40%. A special additive gives Journaltex HD a 60% lower friction coefficient under heavy load than most non-additive type oils.



Lower friction coefficient of Texaco Journaltex HD graphically illustrated. Journaltex HD's ability to resist friction becomes even more pronounced as load-pounds are increased. The uniform quality of Texaco Journaltex HD assures consistently reliable performance.

8 times greater load-carrying capacity

Metal-to-metal contact between journal and bearing, the result of localized high bearing pressure, is a common beginning of hot boxes. Actual tests at Texaco's Research Center prove that Journaltex HD retains its protective oil film at a pressure *8 times greater* than the failure point of a non-additive type oil.



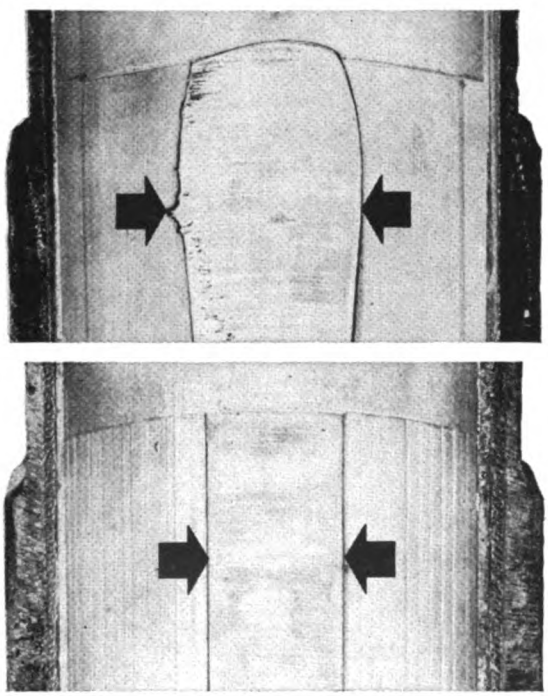
Greater load-carrying capacity of Texaco Journaltex HD graphically illustrated. Journaltex HD retains its protective oil film at a laboratory pressure much greater than would be encountered under average operating conditions.

Journaltex HD can actually prove more economical

Texaco Journaltex HD boxes as much as 40%

Minimum bearing metal displacement

Scored, worn, and misaligned bearings are also a common cause of hot boxes. Texaco Journaltex HD has a built-in characteristic that hinders gross bearing metal removal. Instead, Journaltex HD redistributes minute amounts of babbit... *actually assists in reseating the bearing.*



Smoother bearings with Texaco Journaltex HD. Contact areas of above journal bearings were reduced to 9 sq. inches and subjected to identical tests. Serrated edges (arrows) on top bearing, run on non-additive type oil, indicate considerable metal displacement. Straight edges (arrows) on lower bearing, run on Texaco Journaltex HD, indicate almost no metal displacement.

Savings can reduce car oil costs by 22¢ a gallon

Five major roads reported up to 40% decreases in hot boxes after switching to Texaco Journaltex HD. Savings because of reduced hot boxes can more than offset the slight additional cost of premium Texaco Journaltex HD.

For example: Suppose a road using 200,000 gallons of car oil yearly reduces hot boxes from 1,100 to 660 by switching to Journaltex HD in all journal boxes—using both summer and winter grades. A minimum saving of $100 on each eliminated hot box would net this road $44,000. This sum, if applied to the purchase price of the car oil, would reduce its cost by 22¢ a gallon. Therefore, in real terms, the per-gallon-price of Texaco Journaltex HD is actually about 16¢ less than the price previously paid for the non-additive type oil.

For full details on how Texaco Journaltex HD and unmatched service can mean fewer hot boxes for your road, call the nearest Texaco Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta. Or write:

Texaco Inc., *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.

Tune In: Huntley-Brinkley Report, Monday Through Friday—NBC-TV

TEXACO

Throughout the United States

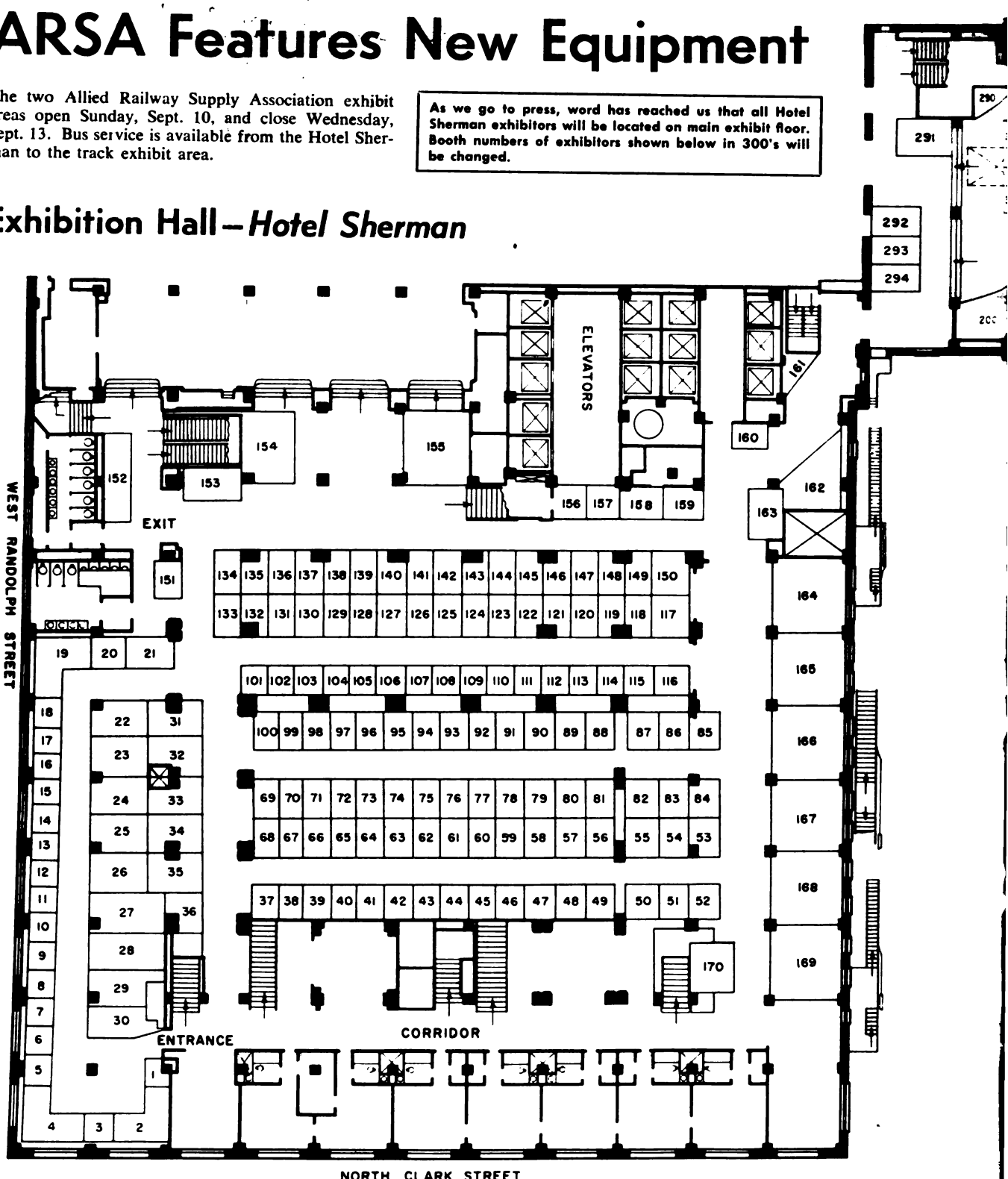
Canada • Latin America • West Africa

ARSA Features New Equipment

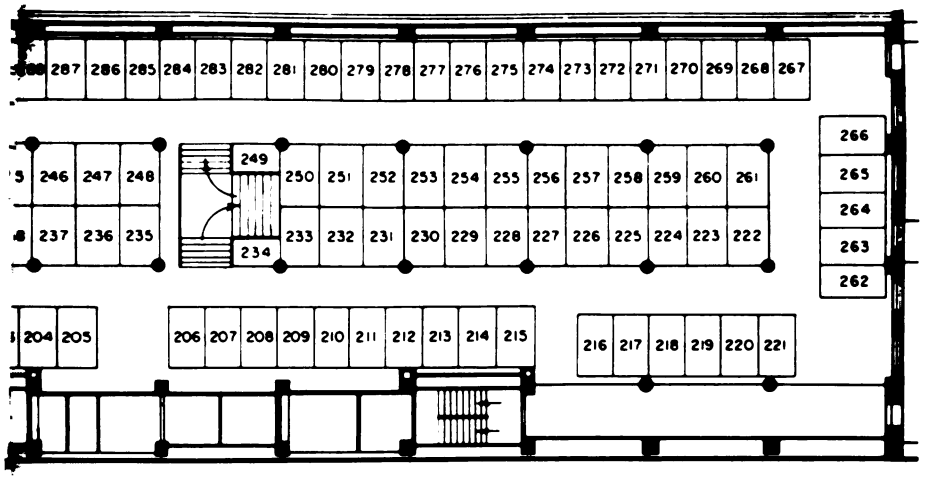
The two Allied Railway Supply Association exhibit areas open Sunday, Sept. 10, and close Wednesday, Sept. 13. Bus service is available from the Hotel Sherman to the track exhibit area.

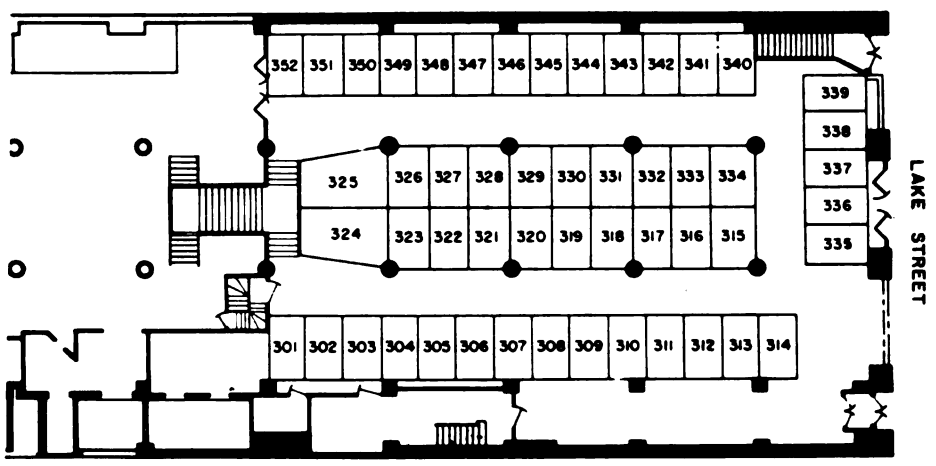
As we go to press, word has reached us that all Hotel Sherman exhibitors will be located on main exhibit floor. Booth numbers of exhibitors shown below in 300's will be changed.

Exhibition Hall—*Hotel Sherman*



Exhibitors	Booth No.
Adams & Westlake Co.	30
Aeroquip Corp.	78 to 81
Ajax-Consolidated Co.	206 to 209
Alert Mfg. & Supply Co.	143 to 145
American Air Filter Co.	26
American Brake Shoe Co.	37 to 41
American SAB Co.	166
American Steel Foundries	230 to 234 and 249 to 253
Arcair Co.	200
Barco Manufacturing Co.	260-261
Bendix Corp.	216
Bom-Kote Corp.	239
Bower Roller Bearing Div., Federal-Mogul-Bower Bearings, Inc.	210 to 212
Buck Equipment Corp.	335-336
Buckeye Iron & Brass Works	88 to 90
Buckeye Steel Castings Co.	226-227 and 256-257
Buffalo Brake Beam Co.	240 to 243
Burrell Flange Lubricator Co.	307
Callaway Products, Inc.	22
Cardwell Westinghouse Co.	165
Chicago Malleable Castings Co.	16
Chicago Pneumatic Tool Co.	228-229 and 254-255
Chicago Railway Equipment Co.	101-102
Chrome Crankshaft Co. of Illinois	325
Chromium Corp. of America	156-157
Clayton Manufacturing Co.	82 to 84
Cleveland Graphite Bronze, Div. of Clevite Corp.	6-7
Cleveland Hone & Mfg. Co.	68
Clinton Co.	110
Component Engine Parts, Inc.	58
Dayton Industrial Products Co.	35
DO Co.	31
Double Seal Ring Co.	258-259
Dover Corp., OPW Div.	305
Dowelac Div., D. B. Frampton & Co.	23
Duff Norton Co.	238-239
Edgewater Steel Co.	106-107
Elastic Stop Nut Corp. of America	48-49
Electric Storage Battery Co.	213 to 215
Electro-Motive Div., General Motors Corp.	262 to 266
Ellcon-National, Inc.	42 to 45
Enterprise Railway Equipment Co.	275
Farr Co.	270-271
FreightMaster, a Division of Halliburton Co.	324
Frost Paint & Oil Corp.	15
Frost Railway Supply Co.	108
General Electric Co.	117 to 126
General Radiator, Inc.	222-223
General Steel Industries	158-159
Gould-National Batteries, Inc.	114 to 116
Gray Co.	74 to 77
Griffin Wheel Co.	281 to 284
Gustin-Bacon Mfg. Co.	272 to 274





LOWER EXHIBIT HALL

Hall-Toledo, Inc. 61-62
Helwig Carbon Products, Inc. 304
Hennessy Lubricator Co. 111
Holland Co. ..... 132 to 135
Hyatt Bearings Div., General Motors Corp. ..... 285 to 287

Illinois Auto Electric Co. ..... 53 to 55
International Railroads Weighing Equipment Corp. 170

Johns-Manville Corp. ..... 71 to 73
Journal Box Servicing Corp. 155

K W Battery Co. 149-150
Kelty Radiator Co. 224-225
Keystone Railway Equipment Co. ..... 12 to 14

LFM Manufacturing Co. ..... 8 to 11
Linde Co., Oxweld Railroad Dept. ..... 91 to 93

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MacLean-Fogg Lock Nut Co. 141-142
Magnus Metal Corp. 98-100
Miller Lubricator Co. 153
Miner, W. H., Inc. ..... 19 to 21
Modern Railroads 152
Mosebach Manufacturing Co. 2
Motor Coils Manufacturing Co. 1

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National Castings Co. 162-163
Nickel Cadmium Battery Div., Nife Incorporated 66-67

Oakite Products, Inc. 17-18
Owatonna Tool Co. 56-57

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Peerless Equipment Division of Poor & Co. ..... 146 to 148
Pocket List of Railroad Officials 160
Precision Engineering Co. 33-34
Prime Manufacturing Co. 112-113
Punch-Lok Co. 59-60
Pyle-National Co. ..... 267 to 269

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Railway Locomotives & Cars 151
Railway Service & Supply Corp. 104-105
Republic Steel Corp., Berger Div. ..... 63 to 65
Russell, Burdsall & Ward Bolt & Nut Co. 109
Rust-Oleum Corp. 291

SKF Industries, Inc. ..... 292 to 294
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Sloan Valve Co. 154
Southland Mfg. Co. 69-70
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Timken Roller Bearing Co. ..... 127 to 131; 136 to 140
Transicold Corp. 36

Uni-Pak Corp. ..... 85 to 87
Unit Truck Corp. 290
Unity Railway Supply Co. 96
Universal Railway Devices Co. 164

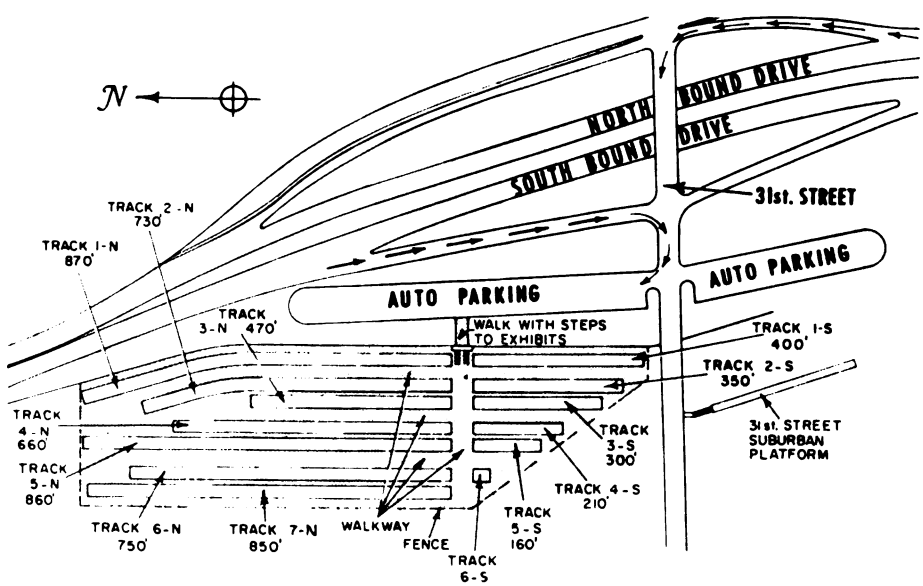
Van Products Co. 279-280
Vapor Heating Corp. ..... 201 to 205
Vascoloy-Ramet Corp. 46-47

Waugh Equipment Co. 167
Westinghouse Air Brake Co. ..... 217 to 221
Wine Railway Appliance Co. ..... 235 to 238; 245 to 248
Wyandotte Chemicals Corp. ..... 50 to 52

Youngstown Steel Car Corp. 169
Youngstown Steel Door Co. 244

Track Exhibit—*Illinois Central 31st Street Yard*

Track Exhibitors	Track
Aluminium Limited Sales	1-S
American Car & Foundry, Div. of ACF Industries, Inc.	2-S
Bethlehem Steel Co.	5-N
Brandon Equipment Co.	3-S
Buck Equipment Corp.	1-N
Buffalo Brake Beam Co.	4-N
Clark Equipment Co.	4-N
Dana Corp.	6-N
Doweloc Div., B. F. Frampton & Co.	6-N
Enterprise Railway Equipment Co.	5-N
Evans Products Co.	4-N
General American Transportation Corp	5-N
Greenville Steel Car Co.	1-S
Hydra-Cushion	5-S
International Car Div., Morrison International Co.	4-N
Koppers Co.	6-N
Landreth Industries	6-N
MacLean-Fogg Lock Nut Co.	4-S
Minnesota Mining & Mfg. Co.	6-S
Mortell, J. W., Co.	3-N
National Castings Co.	5-N
North American Car Corp.	1-S
Pacific Car & Foundry Co.	1-N
Paragon Bridge & Steel Co.	1-N
Peerless Equipment Division of Poor & Co.	1-S
Pettibone-Mulliken Corp., Mercury Div.	1-S
Pullman-Standard	1-N and 2-N
Reynolds Metals Co.	4-N
Ross & White Co.	1-S
Schield Bantam Co.	2-N
Sparton Railway Equipment Div., Sparton Corp.	2-N
Standard Car Truck Co.	1-S
Stran-Steel Corp., Division of National Steel Corp.	6-N
Superior Car Door Co.	4-N
Thrall Car Mfg. Co.	1-N and 2-N
Transportation Specialties Co.	3-N
Union Asbestos & Rubber Co.	3-N
Union Tank Car Co.	4-N
United States Steel Corp.	2-N
Westinghouse Air Brake Co.	3-N
Whitehead & Kales Co.	3-N
Youngstown Steel Door Co.	4-S



INCREASE AB VALVE SERVICING OUTPUT FROM 4 to 7 SETS PER MAN DAILY



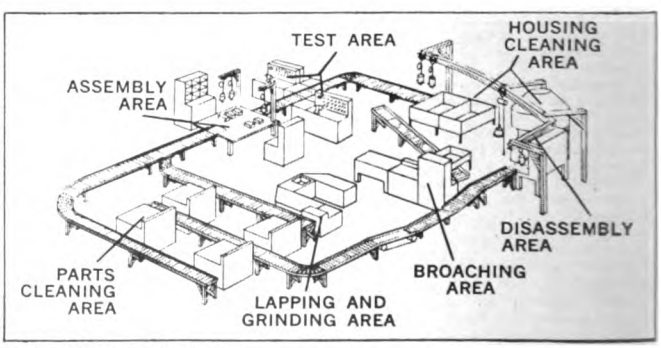
See CP Multi-runners and a typical Brake Room Layout in BOOTH 255

ALLIED RAILWAY SUPPLY ASSOCIATION CONVENTION
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By using CP Multi-runners and mechanized overhaul methods, you can realize big savings on the per set cost of your AB Valve work.

Working closely with maintenance departments, CP engineers have developed Air Brake Room layouts that will reduce costs on your C.O.T. & S. Program. We supply Multi-runners for every disassembly and assembly operation . . . develop time-saving conveyor and bench arrangements . . . recommend suitable cleaning, lapping, boring and test equipment.

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Typical Brake Room Layout

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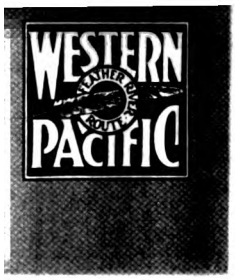
NOW IN SERVICE ON 36 RAILROADS



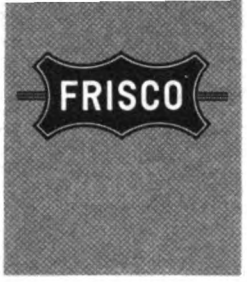
See Booths 42-45 at the Allied Show

ELLCON-NATIONAL INC.

30 CHURCH ST., NEW YORK 7, N.Y.

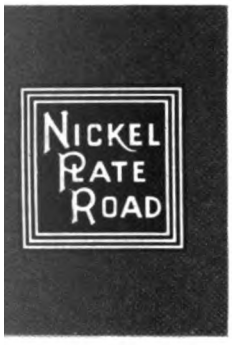












67 Railroads declare cold war on the hot box

67 railroads are spearheading the switch that's routing the hot box problem. They're going "Roller Freight"—solving the problem by eliminating the cause. The 67 railroads and 38 other freight car owners now have over 77,000 cars on Timken® tapered roller bearings in service or on order. Two out of three new cars ordered in 1960 were on roller bearings. And leading the way are Timken tapered roller bearings, the railroad bearing of proved performance.

With cars on Timken tapered roller bearings, freight trains can roll at high speeds, stick to schedules, give shippers better service than ever. Cars on Timken bearings are averaging more than a hundred million miles between car setouts caused by overheated bearings. That's because Timken bearings roll the load instead of sliding it.

Now's the time to make the switch. When all freight is "Roller Freight" the railroads will save an estimated $288,000,000 annually in operating and maintenance costs—about $144 per car—based on the Timken Company study, "The Use of Roller Bearings on Freight Cars—An Economic Study". And they'll be in a position to win more business with the best service ever. Write for information. The Timken Roller Bearing Company, Canton 6, Ohio.





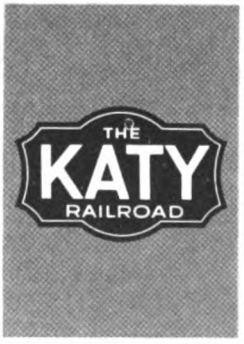














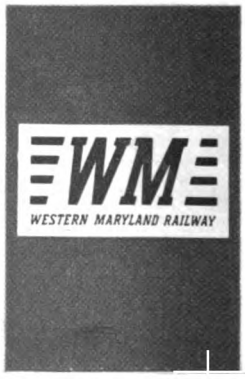














Reading Lines

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SAFETY FIRST DULUTH MISSABE AND IRON RANGE

THE MILWAUKEE ROAD

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NEW YORK CENTRAL SYSTEM

PITTSBURGH & WEST VIRGINIA RAILWAY P&WV

CENTRAL OF GEORGIA

PRR

Burlington Route

LINKING 13 GREAT STATES WITH THE NATION B&O

CNS&L

RICHMOND WASHINGTON LINE

CLINCHFIELD RAILROAD

GM&O

ATLANTA & SAINT ANDREWS BAY RAILWAY CO. The BAY Line

GREEN BAY ROUTE

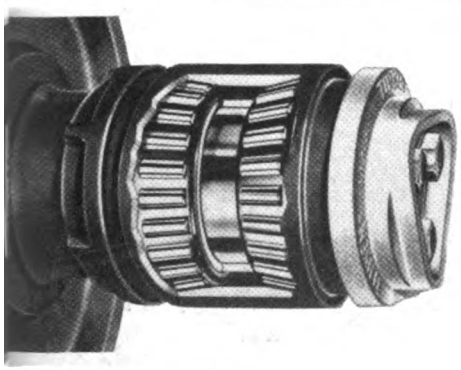
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PACIFIC GREAT EASTERN RLY.

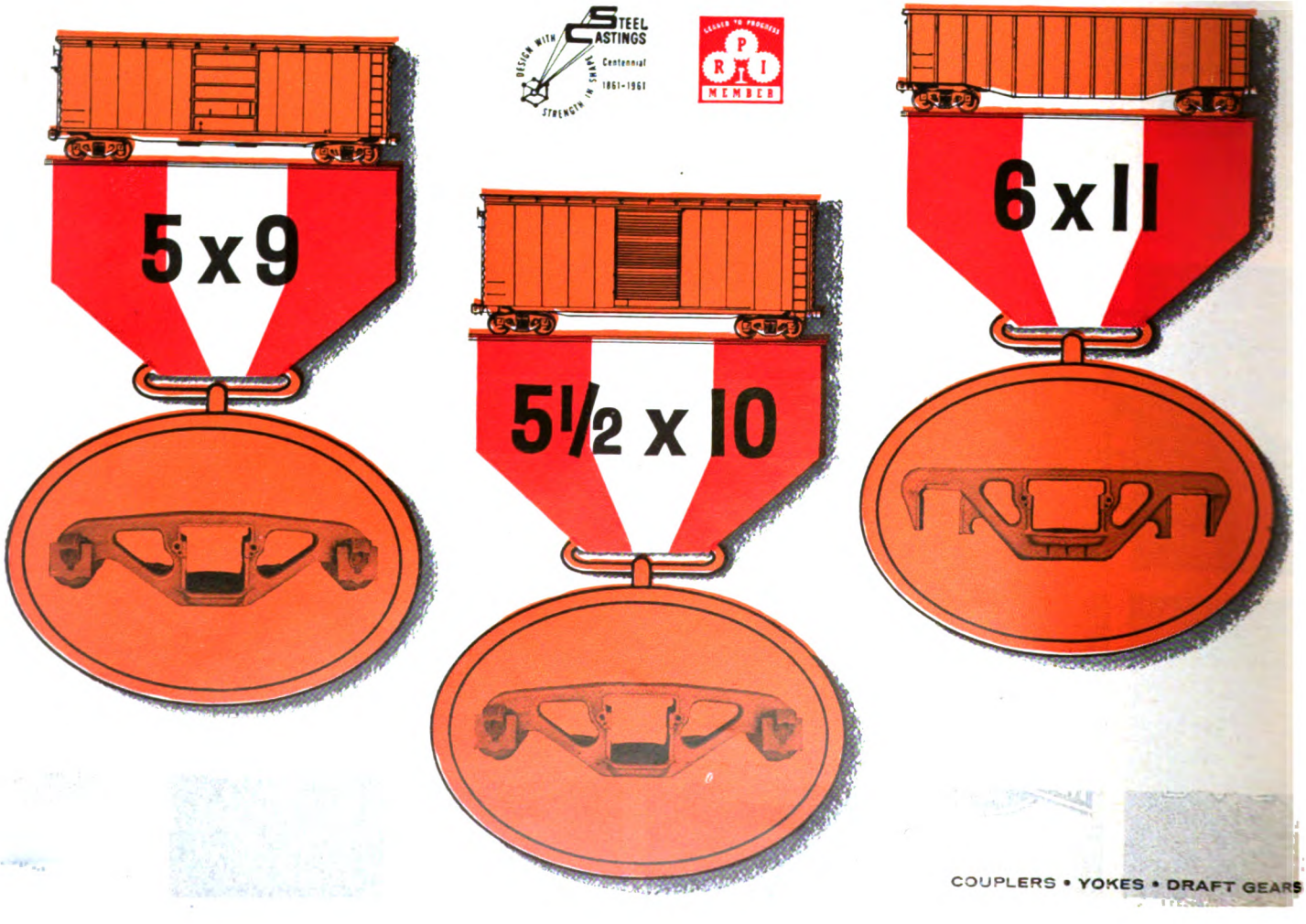
There are many good NATIONAL

In this case it's

Now National offers a complete family of freight car trucks. From the familiar 5 x 9 . . . through the widely-used 5½ x 10 and 6 x 11 . . . to the new and stronger 6½ x 12 for heavy duty freight service.

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reasons for specifying

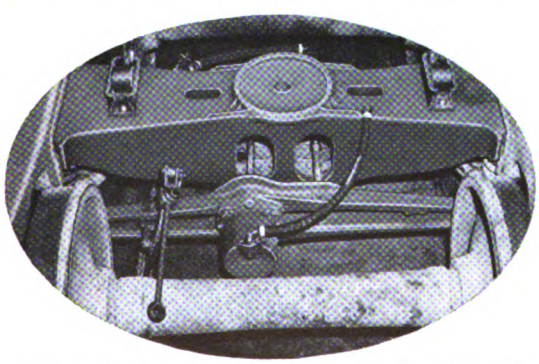
C-I TRUCKS

STRENGTH





*The new design tension member is a combination of inverted "U" section at the lower part and conventional "U" at the upper part. It reduces stresses up to 28% in lower part and up to 20% in upper part over conventional "U" sections of same size. In addition to considerable stress reductions a more even stress distribution throughout the whole frame is obtained with this new design feature.



If specified at time of order, optional 6 x 11 and 6½ x 12 truck bolsters can be supplied to accommodate the Wabcopac Brake Assembly.

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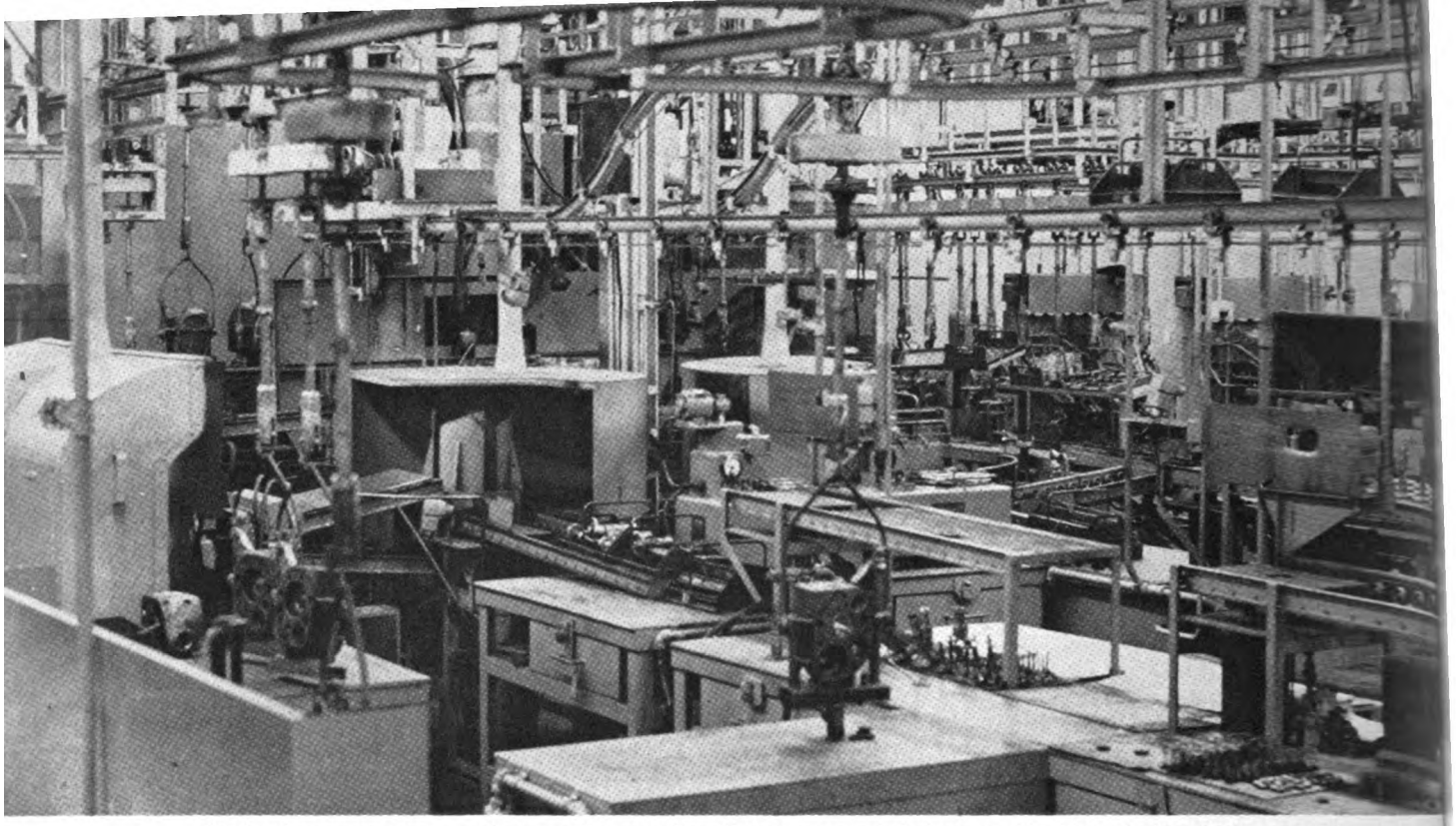
These men are trained Service Engineers employed by ASF *but they work for you!* To that end, each ASF Service Engineer regularly visits railroad facilities throughout his assigned territory, ready to serve in any way to help make the railroad man's job easier and more productive.

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Canadian Manufacturer and Licensee: International Equipment Co., Ltd., Montreal 1, Quebec
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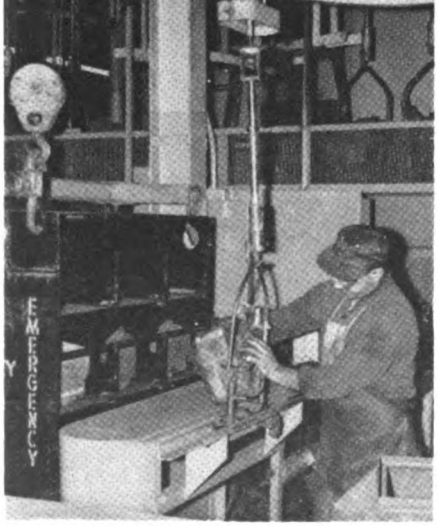
Overhead conveyor systems make it possible to utilize all floor space and eliminate need for lifting the heavy valve portions.

Pennsy Brake Shop Overhauls 200 A

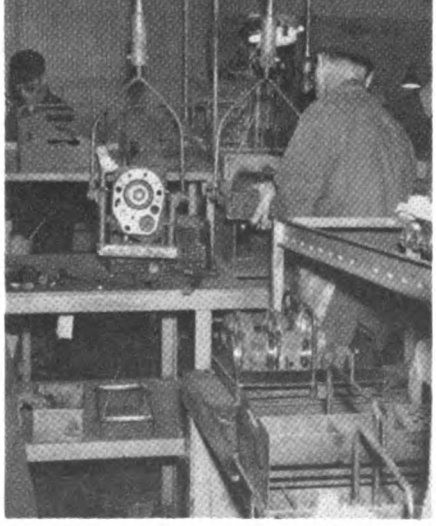
All freight-car air-brake-valve portions applied by the Pennsylvania are now overhauled at the road's recently completed and highly mechanized shop in Hollidaysburg, Pa. AB valve portions are cleaned, oiled and tested at the rate of 200 car sets—400 portions—during an 8-hr shift. Shop processes and equipment have been developed to comply with all AAR cleaning, gaging and test codes.

When the shop went into full production in January 1961, it made possible the consolidation at Hollidaysburg of work previously done at five separate points on the Pennsylvania system. The new centralized air-brake shop is located at the Samuel Rea Shop, the huge PRR freight-car heavy-repair facility which was opened in 1955 (RL&C, Nov. 1955, p 39). All AB portions are moved to and from other repair shops and light repair tracks on the PRR in specially designed shipping containers which can be handled by fork lifts and overhead cranes.

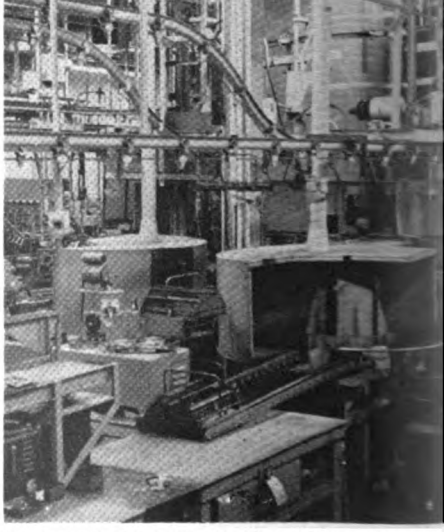
Because of the repetitive nature of the operations involved in the periodic overhaul of AB service and emergency portions and because of the large volume of this work, Pennsy mechanical officers in 1958 began to de-



Portion is clamped in fixture. Carrier activates limit switches, showing this to be an emergency portion.



Portion is tipped so multiple-spindle wrench can remove three cap screws simultaneously. Parts removed are placed in special baskets.



Service portion parts are cleaned in ultrasonic machine at center; emergency parts, in machine behind it.

velop a shop which would incorporate the maximum practicable degree of mechanization. Freight-car building and repair programs at Samuel Rea Shop, a component of the PRR Altoona Works, generate a large volume of brake portions requiring cleaning overhaul, and testing. Altoona is at about the "center of gravity" of the Pennsylvania system, and movements of portions to and from this point, it was estimated, would involve less transportation than other sties.

The area in which the new production lines have been established is a section of the air-brake shop originally built at Samuel Rea. Because this bay is still used for overhauling cylinders, pistons, retainers, and other brake components for cars undergoing heavy repairs, it was possible to assign only about half the shop area to the AB valve overhaul operations.

A pair of almost duplicate facilities has been installed in an area 70 ft by 55 ft. One set of conveyors, jigs, benches, and tools has been arranged to process service portions exclusively. A similar arrangement on the opposite side is designed for the emergency portions. Because of the greater complexity of the AB service portion, it is necessary to devote slightly more area to service-portion overhaul operations.

After studying different methods of moving the brake portions through the sequence of operations, PRR engineers concluded that the roller conveyors used in many shops would not be suitable for the congested area and high production which was planned. The result is four separate overhead conveyor systems installed under the roof trusses which are approximately 14 ft above the floor. Both service and emergency lines have a pair of conveyors—the main loops capable of moving complete valves and valve bodies through the sequence of cleaning, disassembly, inspection, assembly, and testing; the others being of lower capacity on which small parts are moved in baskets from disassembly through cleaning and inspection to the assembly benches.

There are approximately 750 ft of overhead conveyor. About half of this is powered and all powered sections are cable driven. The main conveyors are powered only in certain sections. The small-parts conveyors are completely powered. Unlike the roller conveyors used in many railroad shops, this system has been designed to allow for only a minimum of "live" storage.

Along with the overhead conveyors, PRR officers summarize other innovations in their air-brake shop as follows:

- Valve exterior cleaning with soft abrasive;
- Valve disassembly with multiple-spindle wrenches;
- Automatic brushing of valve body gasket faces;
- Multiple jet blowing of valve body passages;
- Flowrator checking for flatness of slide valve seats;
- Valve assembly with multiple-spindle wrenches.

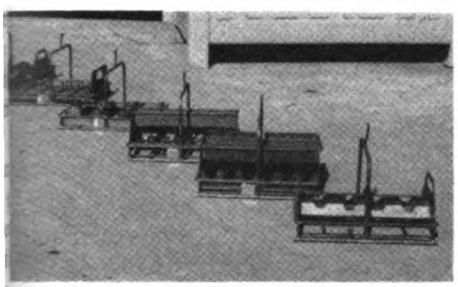
An important feature of this shop is that portions and portion bodies need never be lifted as they pass through the overhaul sequence. At all times the body remains in the work holding fixture suspended from the carrier on the overhead conveyor. The complete portion is placed in this fixture as it is removed from the shipping container at the entrance to the shop. All shop tools and fixtures are then arranged so that the body can remain suspended from the conveyor until it arrives back at the shipping area completely cleaned, lubricated, and tested.

In addition to complying with all AAR prescribed procedures and tests, the PRR aims to remove a minimum of metal from wearing surfaces so that it can obtain maximum service from bushings, valves, and similar components. All finishing and dressing of such surfaces is done only as a result of inspection. There are no mandatory machining operations with the exception of the slide valves which are all lapped on a pair of automatic lapping machines. Valves requiring new bushings are returned to the air brake manufacturers.

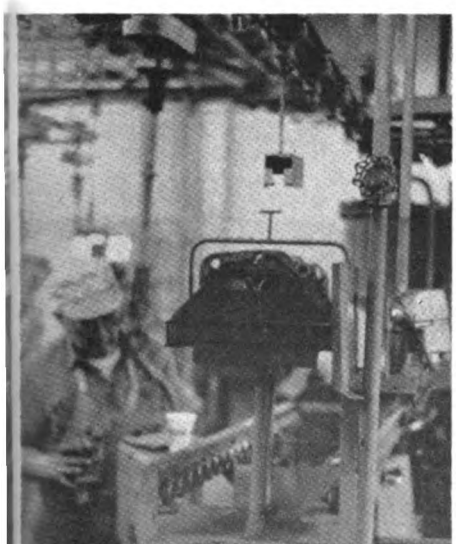
When the shop was designed for an output of 200 car sets in 8 hr, it was realized that it must be arranged to produce more than this. More thor-

(Continued on page 60)

alves Daily



Six baskets, all of same exterior design, are arranged to hold different valve parts.

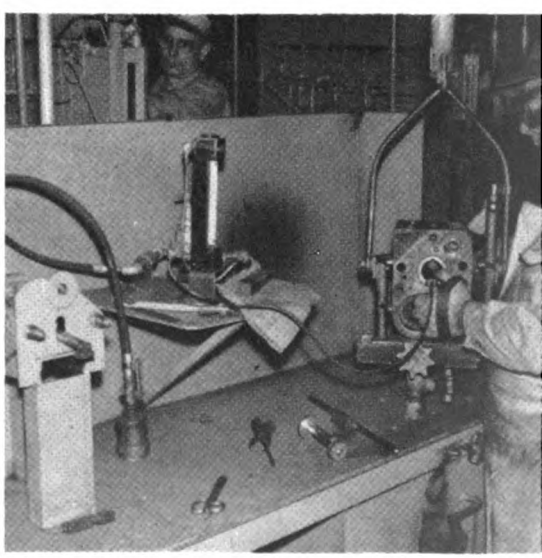


Basket of cleaned parts is dropped to roller conveyor over the assembly bench after it is automatically removed from overhead conveyor.

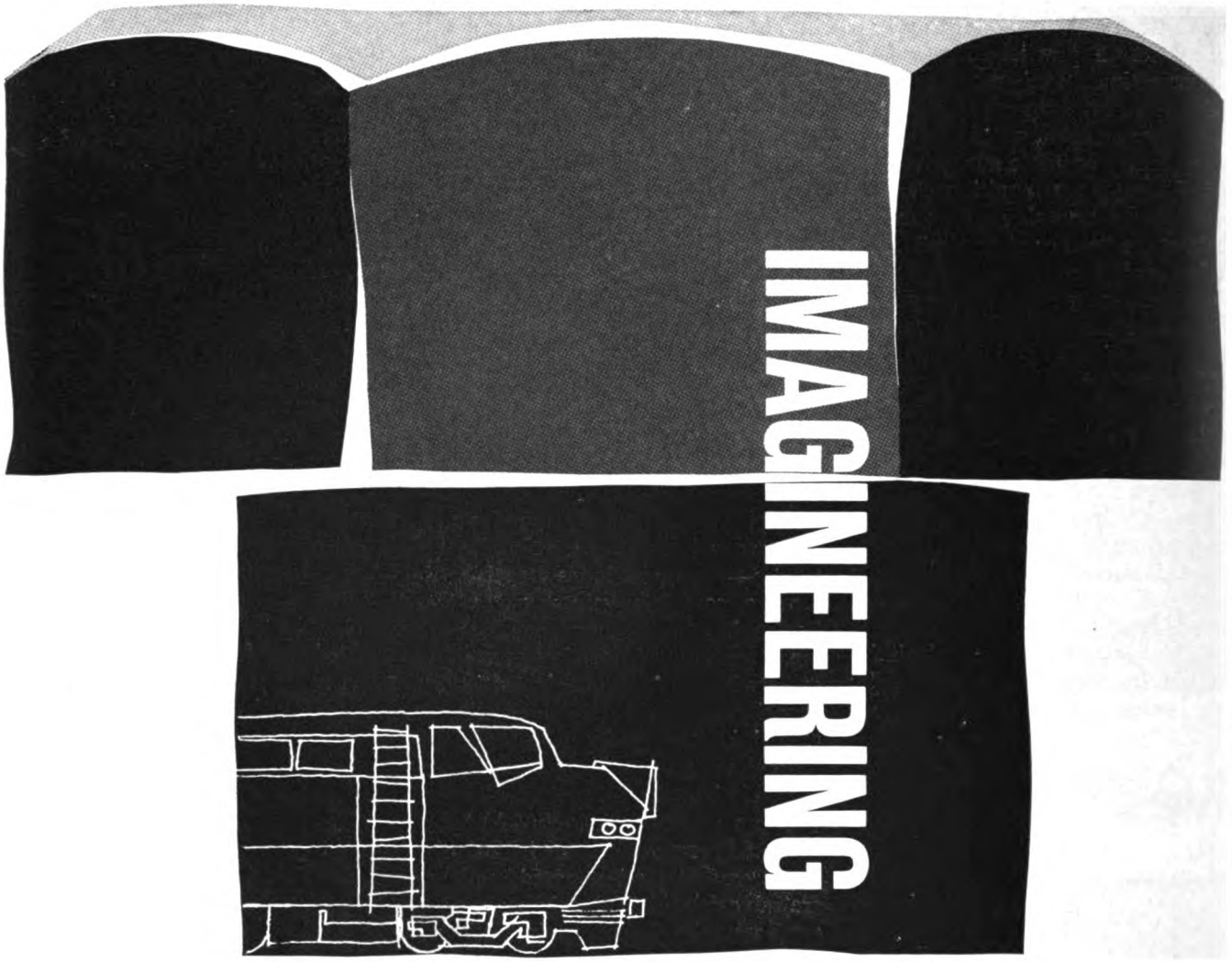




Gasket faces are brushed automatically (left); blowing device cleans passages (right).



Flowrator checks flatness of slide-valve seat in bushing. Portion is never removed from the carrier or lifted at any bench.



That's the bold, new look at Screw & Bolt that says high strength HEAVY HEX BOLTS replace rivets—or two bolts now do the work of three! ■ *Imagineering* is also the foresight that puts right at your doorstep, in just one source, a multitude of threaded fasteners and parts such as frog, track and switch bolts—drive spikes and dowels—brake pins and shoulder bolts. Then, there's the widest range of regular nuts and bolts. ■ When you need a fastener or threaded part, think of *imagineering!* Call Screw & Bolt!

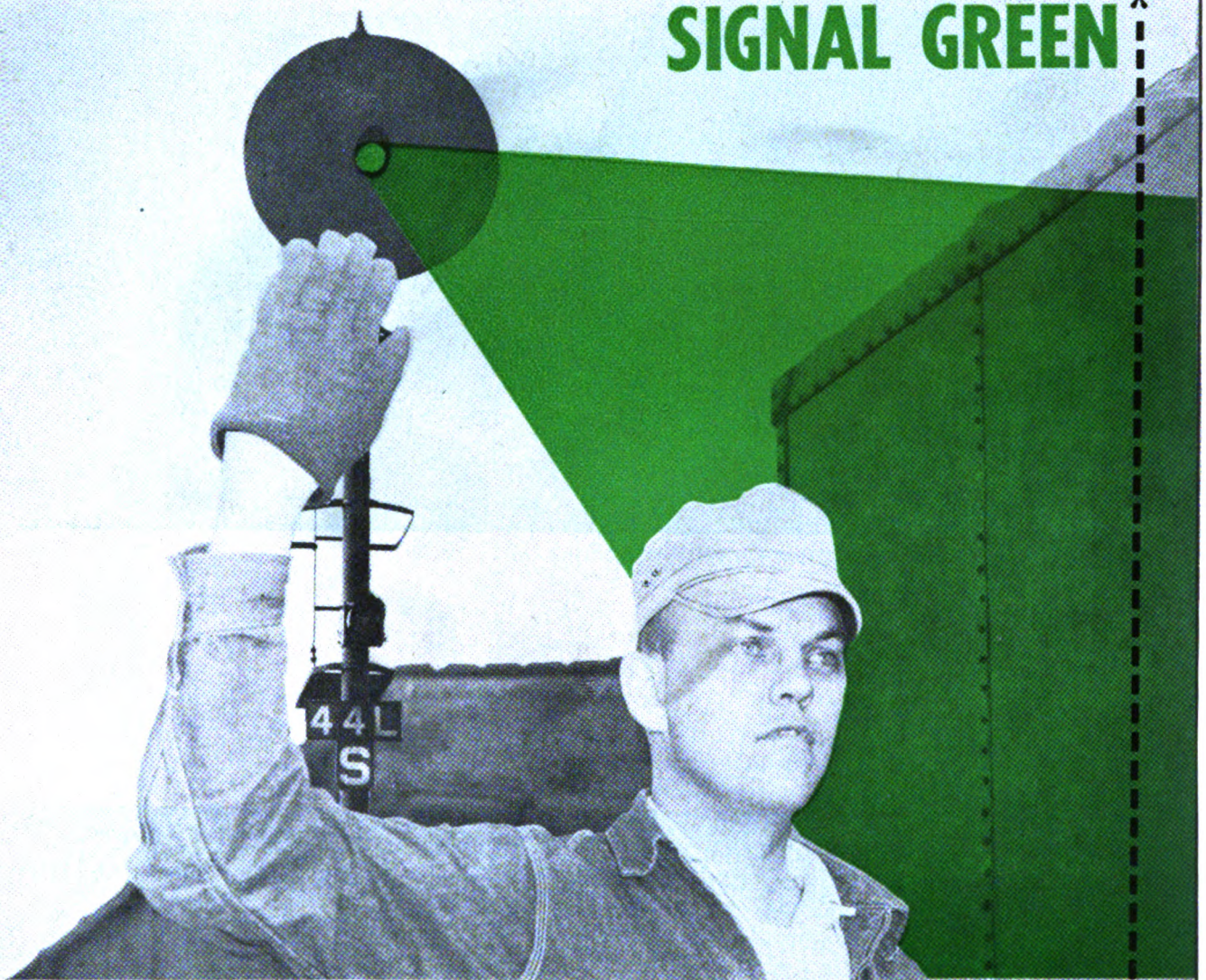
VMA 9417

SCREW AND BOLT CORPORATION
OF AMERICA • **P.O. BOX 1708, PITTSBURGH 30, PA.**

Plants: Pittsburgh, Pa. Gary, Ind. Southington, Conn. Norristown, Pa. • Warehouses: Portland, Ore. Denver, Colo. Atlanta, Ga.

Imagineering... for greater fastener progress

SOUTHLAND
LUBRICATORS KEEP THE SIGNAL GREEN*



Southland Lubricator Pads are contoured to fit naturally and easily into the journal box and against the journal to assure safe, ample and economical lubrication under varying temperatures.

The highly oil resistant foam cores absorb and retain oil, creating a constant supply of oil to the myriad of looped lubricating wicks and onto the journal surface.

Southland Lubricators are extra heavily designed and constructed for long life and trouble-free service. Materials are super strong and quality craftsmanship builds positive economies into every Southland unit.

Easily installed; so efficient in service, Southland Lubricators are the natural and correct way to lubricate journals positively and economically.

We'll gladly send you detailed data on Southland Lubricators and explain the difference, **naturally**.

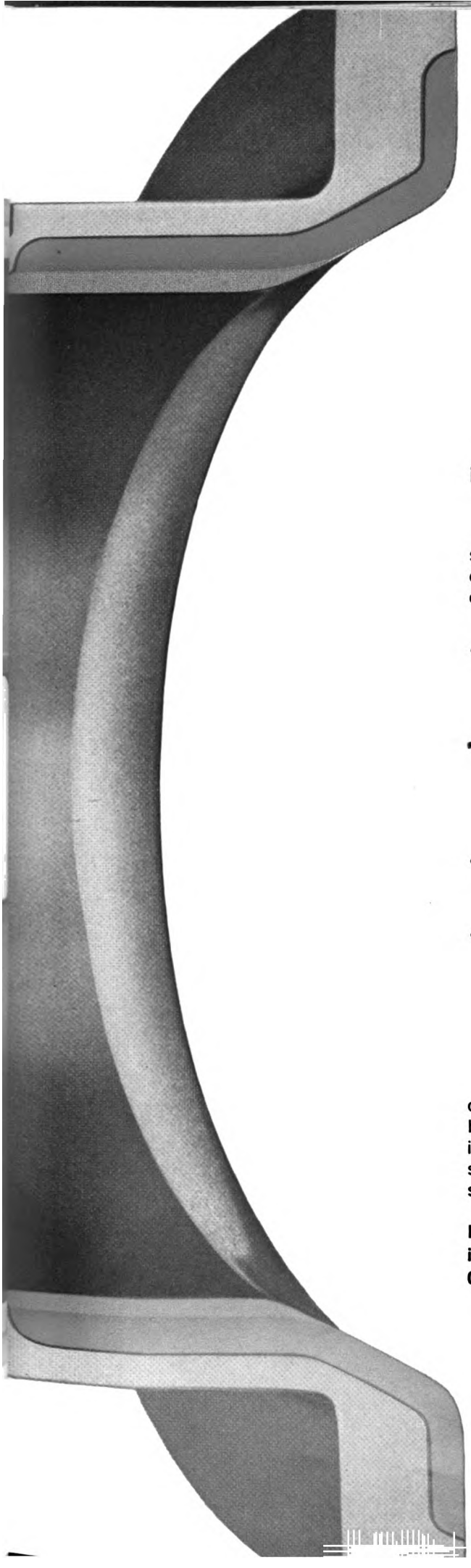


AAR Conditionally Approved *

SOUTHLAND MFG. CO., INC.
700 Front Street, Norfolk 10, Virginia

In Canada
Dominion Railway Car Supply Co. Ltd. Montreal, Quebec


50% Longer Flange Life



New Electro-Motive Flange-Lubricated Traction Motor Support Bearing

an exclusive design now available at no increase in cost as part of EMD's new bearing conversion plan.

Fifteen years of research, laboratory and field testing have resulted in Electro-Motive's new controlled lubrication bearing, an exclusive design which provides 43% increased oil capacity, lengthening miles between refills, and 50% longer flange life.

- New narrow window wick utilizes newly developed, high-capillary-action one-piece felt which delivers uniform oil film to the journal surface, lowering operating temperatures, extending bearing life.
- Full flange lubrication is provided by four felt flange lubricators which gather and transmit oil to the flange face. Lateral movement of the axle or traction motor automatically applies the correct amount of oil to the wheel or gear hub.
- Reduced oil consumption is the result of a narrow window opening which virtually eliminates splash loss.
- Increased bearing capacity is made possible by thirty-three square inches of bearing surface added to the new unit, and movement of the window out of the lower load zone for extra bearing area and support.

NEW ELECTRO-MOTIVE CONVERSION PLAN

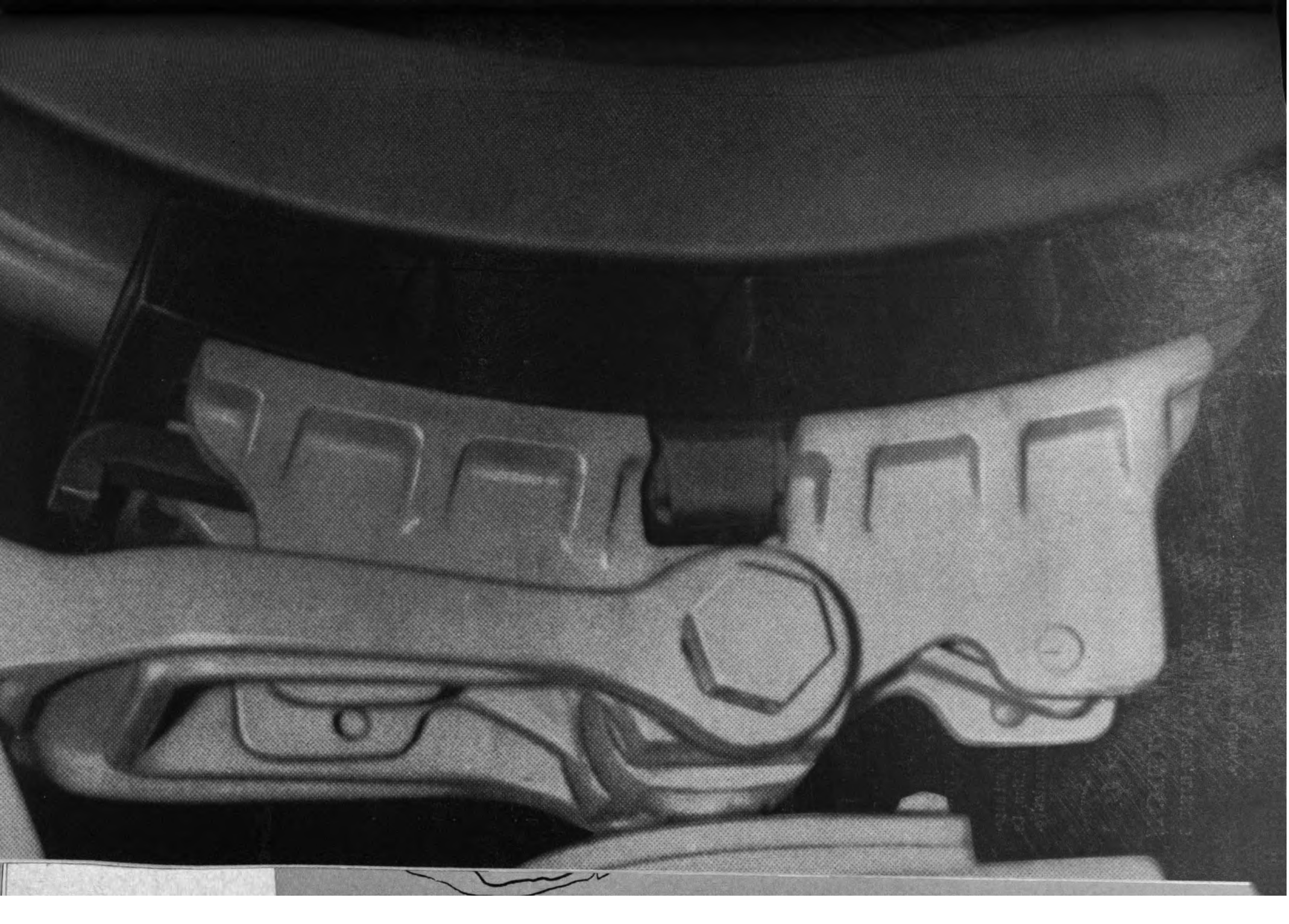
Now you can trade in worn traction motor support bearings and other brass scrap on new Electro-Motive flange-lubricated bearings by taking advantage of EMD's new conversion plan. The plan utilizes a straight weight conversion of worn bearings or equivalent scrap brass for new Electro-Motive flange lubricated traction motor support bearings at no increase in cost.

For complete information on the new EMD traction motor support bearing and bearing conversion plan, write Electro-Motive Division, La Grange, Illinois, or contact your nearby Electro-Motive Representative.

GENERAL MOTORS LOCOMOTIVES

DESIGNED TO PERFECT PRI

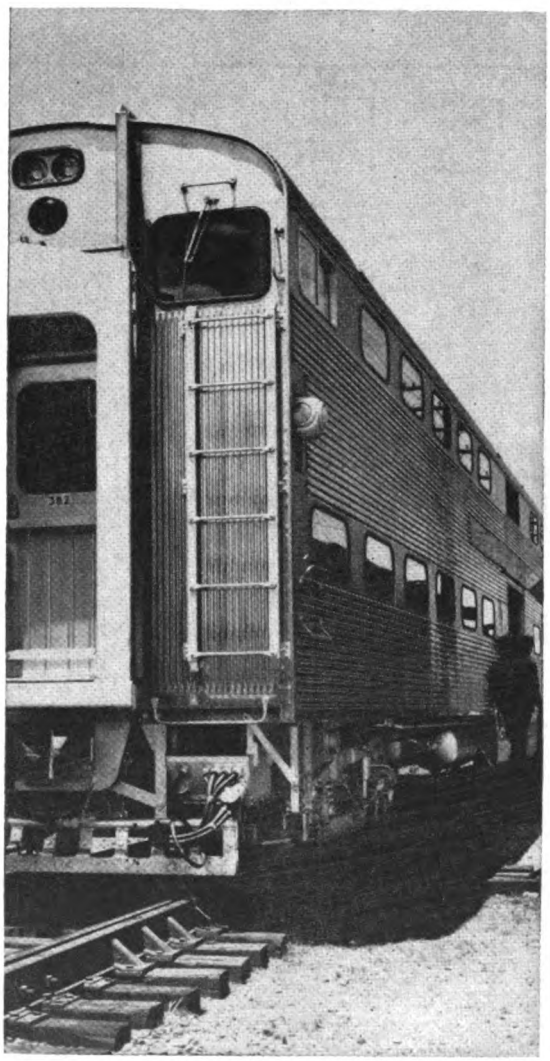
ELECTRO-MOTIVE DIVISION
GENERAL MOTORS · LA GRANGE, ILLINOIS
HOME OF THE DIESEL LOCOMOTIVE
In Canada: General Motors Diesel Limited, London, Ontario.



The Milwaukee Road has

COBRA® SHOES

on their new bi-level suburban fleet. Here's what The Road will get:



- Lowest shoe cost per mile
- Improved wheel performance
- Lightest-weight truck and brake equipment
- Freedom from thermal cracked wheels
- Satin smooth ride and stops
- Fewer replacements and lower maintenance costs

Equipping 40 new bi-level stainless steel coaches with Cobra Shoes makes it possible for the road to use lightest-weight truck brake equipment for its dual-control suburban train operations. Smooth, highly polished wheels provide best wheel to rail adhesion. Lower fuel costs, lower wheel costs, and Cobra Shoes mean lower operating costs for The Milwaukee Road each year. The coaches will ride better, too, because of the uniform braking characteristics of the Cobra Shoe, the smooth, highly polished wheels and the reduction of unsprung dead weight. Let our representatives give you more detailed information.

THE COBRA SHOE . . . a product of the combined research facilities of . . .

Westinghouse Air Brake Company
Specialists in Braking

Johns-Manville Corporation
Specialists in Friction Material

RAILROAD FRICTION PRODUCTS CORPORATION
Wilmerding, Pennsylvania

(Continued from page 53)

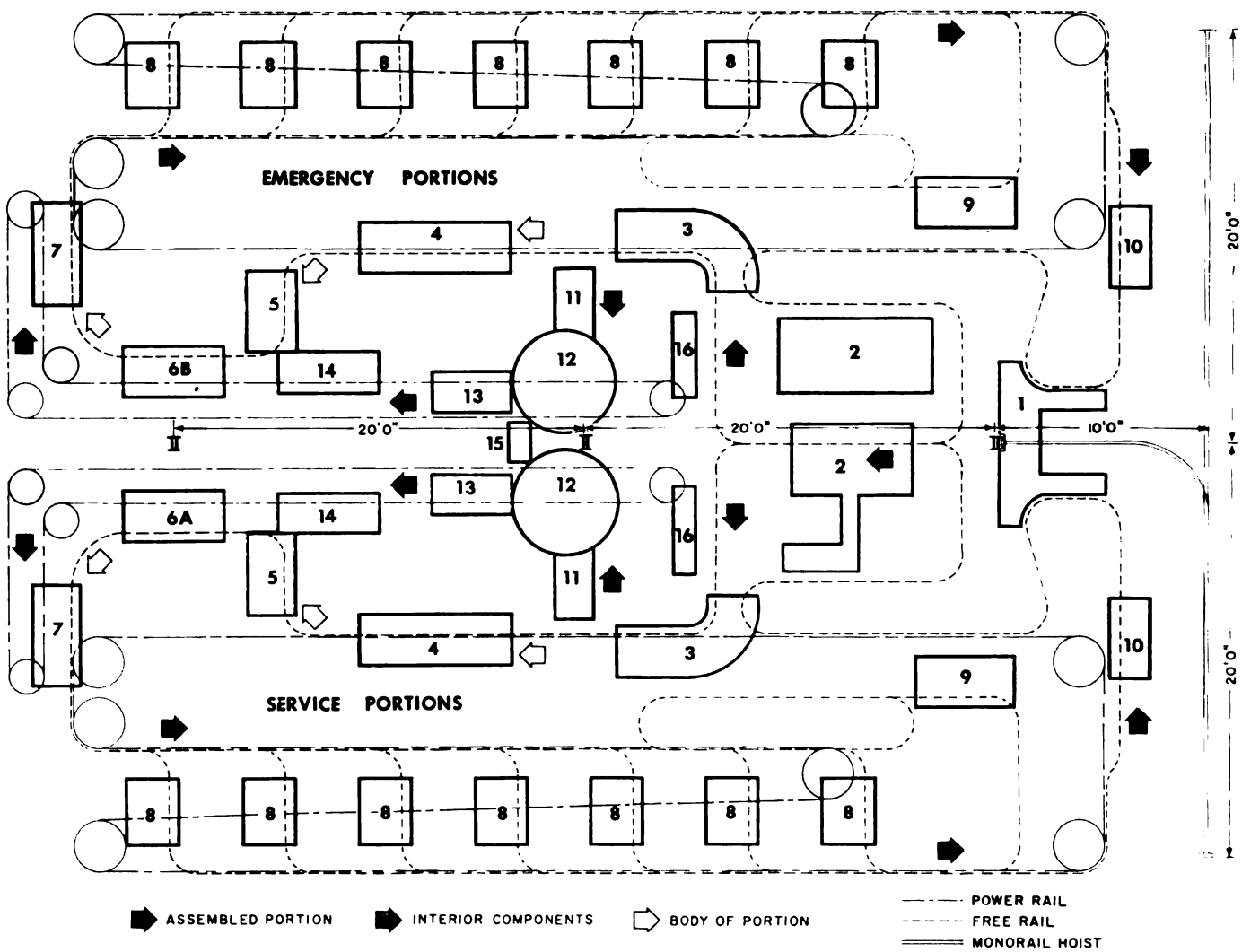
ough cleaning and the improved and more uniform inspection have reduced the number of portions which fail to qualify for return to service when initially placed on one of the test racks. Currently, this reject rate is running under 15%—much less than the rate which prevailed when the Pennsy operated low-production, unmechanized air-brake shops at several points on its system. In any case, the consequence of failure to pass rack tests is that the portion must be repaired—sometimes completely disassembled again. Such operations reduce productivity. Every effort is made to control work quality at every step to reduce rejects.

Test racks used are of the conventional manual type which incorporate all the devices required by latest AAR codes. Rack operators are able to repair or adjust many portions so they can successfully complete the test cycle without being removed from the rack. This was an important factor in not attempting to automate test rack operations, even though such equipment is now available.

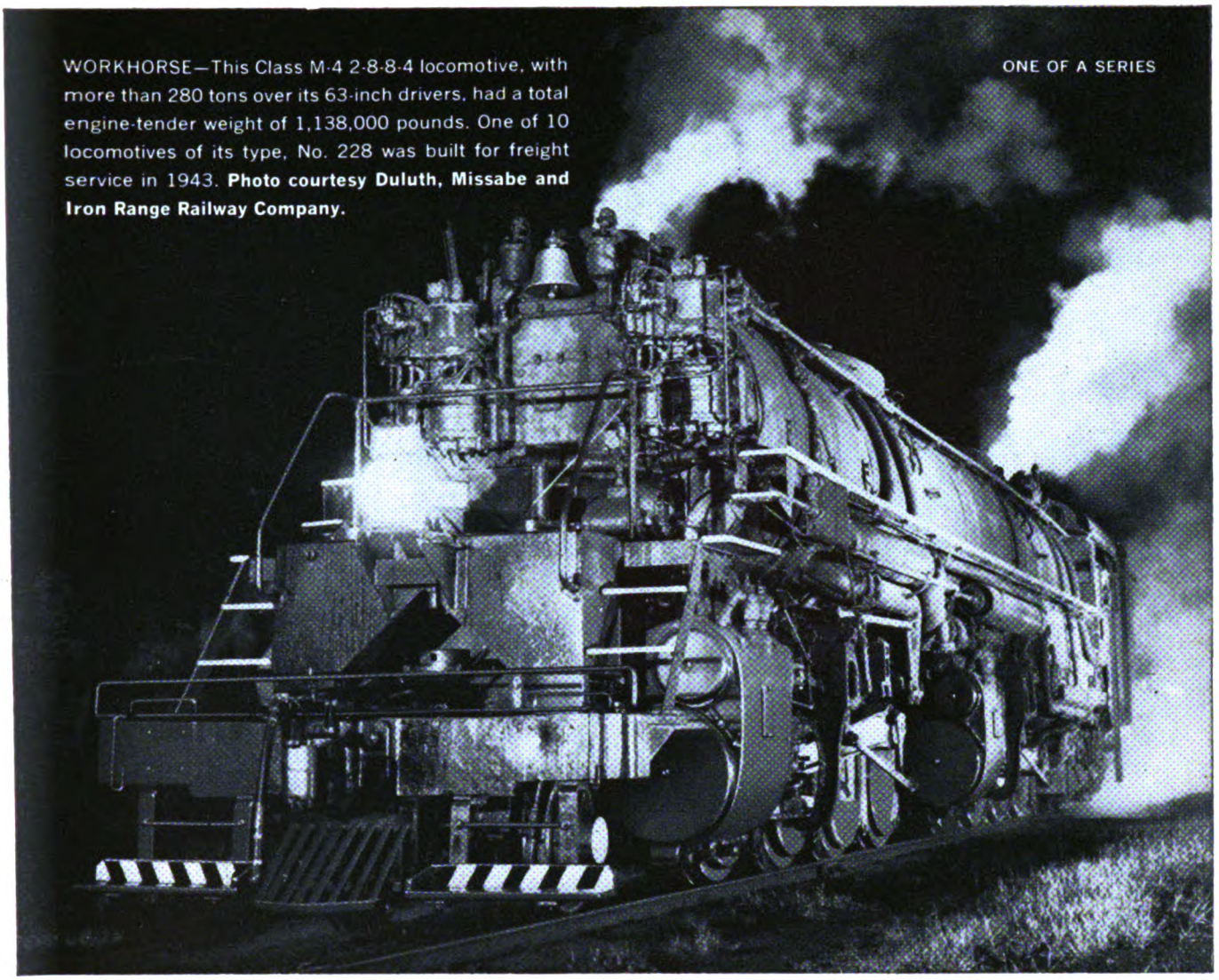
"Automation" could not properly be used to describe this shop. Instead, it might better be designated as "highly mechanized," designed for maximum production per man-hour. There are 18 machinists and four machinist helpers on each of the two production lines. One lapping machine operator handles both service portion and emergency portion slide valves. This means a total force of 45 men for the one-shift operation. In addition, there are two machinist helpers on the second shift who sort, inspect, clean, and gage the gaskets, chokes, cap screws, and similar components removed at the disassembly benches during the day. Industrial engineering techniques were used to balance the work load at the work stations.

Operation of the shop is best understood by following the sequence of operations from the time a portion is removed from the shipping container until it is again placed in a container for return to a point where it will be reapplied to a freight car for another four-year term of service. While the service portion line will be used as the example, it should be understood that the emergency portion line is equivalent in every way, with the only differences being those which result from variations in the designs of the two types of brake portions. In fact, both types of portions initially travel over the same conveyor through the abrasive blast cabinet for external cleaning.

(Continued on page 62)



1. Unloading and loading station
2. Abrasive blast cabinet and dust collector
3. Disassembly bench
4. Cleaning and inspection bench
5. Piston and slide valve application bench
6A. Quick Service limiting valve bench
6B. Emergency ball check valve bench
7. Back cover application bench
8. Test rack
9. Rework bench
10. Shipping cover application bench
11. Parts disassembly bench
12. Automatic ultrasonic parts cleaning
13. Slide valve gaging and conditioning bench
14. Piston and slide valve assembly bench
15. Lapping machine
16. Parts container storage rack.



WORKHORSE—This Class M-4 2-8-8-4 locomotive, with more than 280 tons over its 63-inch drivers, had a total engine-tender weight of 1,138,000 pounds. One of 10 locomotives of its type, No. 228 was built for freight service in 1943. **Photo courtesy Duluth, Missabe and Iron Range Railway Company.**

ONE OF A SERIES

Legacy of Reliability

This rail giant shown steaming its way through the night was a symbol of dependability—truly a home-front hero in the 'round-the-clock crisis of World War II.

And in the same race against time, Ex-Cell-O Pins and Bushings were also hard at work, putting a solid measure of precision and reliability into the rolling stock of more than 200 U.S. and Canadian railroads.

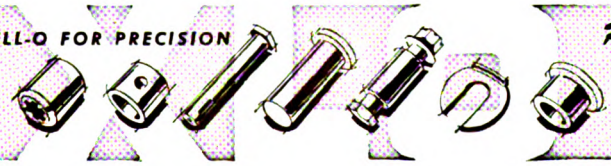
Hardened and precision-ground Ex-Cell-O railroad details continue to keep pace with progress, just as the motive power of America's great railroads has kept pace with peacetime demands for greater efficiency.

Up-to-date heat treatment methods and fast, extremely accurate production machines make today's "diamond hard" Ex-Cell-O Pins and Bushings more dependable than at any time in their long history of reliability.

We invite your close inspection of the savings and service Ex-Cell-O can contribute to your maintenance program. Call our Representative in your area, or write direct to Ex-Cell-O in Detroit.

60-21

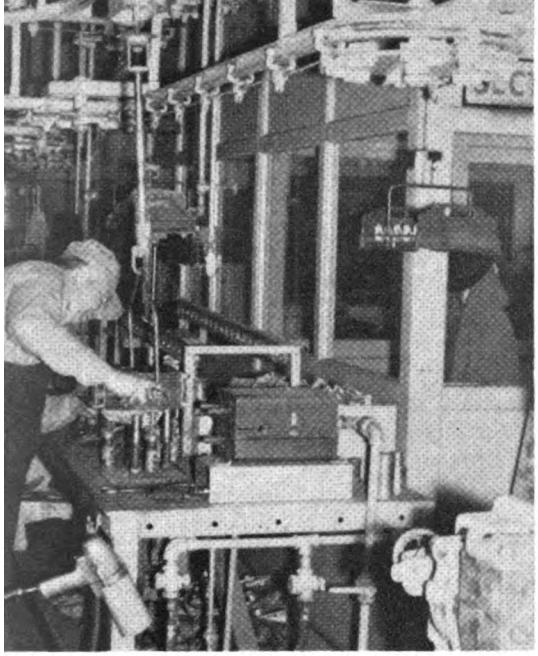
EX-CELL-O FOR PRECISION



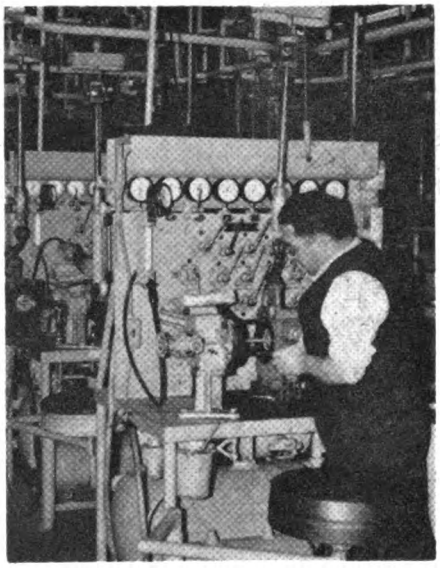
Railroad Division

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN



Applying back cover with multiple-spindle wrench completes emegrency portion assembly.



Portions may be repaired while on test rack, or portion moves to rework bench.



Shipping cover is applied at bench which ha strainer cleaning device.

(Continued from page 60)

Carriers which travel around the main conveyor loop are at the loading station when they are emptied after having completed a cycle through the system. A machinist helper clamps each portion into the work holding fixture which is a part of the carrier. The shipping cover remains in place on the portion to protect it during abrasive cleaning. The system allows approximately 2½ min at each work station ahead of the test racks. The carrier with its portion in place is moved on to a powered section of the conveyor which takes it into an abrasive cleaning machine. Because both service and emergency portions travel over the same conveyor line, a series of mechanical switches determines which portion is in greatest demand on the lines and operates to feed that type through the cleaning cabinet first. The carrier moves to the center of this cleaning machine, stops, engages a driving chain which rotates it and its load for about 20 sec while a five-nozzle cleaning head travels down past the slowly turning portion. Crushed walnut shells are used for the abrasive, and the unit has its own dust collector. Portions emerge with their exteriors thoroughly cleaned.

Next, the service portion moves to a disassembly bench where two machinist helpers operate five multiple-spindle impact wrenches which remove the shipping cover and four other components which make it possible to completely disassemble the portion. These wrenches were all specially designed for their complicated bolt removal jobs. For instance, taking off the duplex release valve requires the simultaneous removal of two bolts and two cap screws. Other components which come off at this disassembly bench are the back cover, the quick service limiting valve assembly, and the check valve cover. Standard impact wrenches fitted with spline and screwdriver tools are then employed to remove all the chokes from the body of the portion.

Nuts and bolts automatically go down chutes into containers for transfer to the assembly benches. The gaskets and chokes are placed in individual containers for subsequent gaging and inspection to determine if they are reusable.

Parts removed during disassembly are placed in small baskets which move to the ultrasonic cleaner and then are picked up by the small-parts conveyor system and automatically delivered to the proper assembly bench. Individual parts baskets are designed to hold the following service portion components:

- Piston and slide-valve assembly;
- Check-valve case;
- Duplex release-valve parts;
- Piston return spring and cage;
- Back cover.

Each basket will hold from four to twenty of these components, depending on their size and shape. All baskets are of the same size and exterior shape. Some carry mirrors on their sides which are set to activate photoelectric cells operating mechanisms that remove the baskets from the conveyors at the proper assembly benches.

A short section of roller conveyor extends from the disassembly bench to the automatic ultrasonic parts cleaning machine. The filled parts baskets are placed on this conveyor and are then passed through the entire cleaning cycle with no further attention. An air-operated, indexing-type transfer mechanism picks each basket from the roller conveyor, rotates it to the ultrasonic cleaning tank, and submerges it for the 2½-min-cycle. It is then rotated an additional 90 deg and placed in a rinsing tank. The next cycle automatically elevates the baskets of cleaned and rinsed parts to a position under the small parts conveyor cable. A pick-up fixture, suspended from the cable, automatically picks up the baskets of parts and carries them to the appropriate work location where the parts are reassembled into the body. Baskets loaded with sets of four pistons and slide valves are automatically lifted from the rinse tank onto a short section of roller conveyor on which they travel by gravity to an adjacent bench on which the piston and slide valve operation is performed.

The ultrasonic cleaning machine was designed and built by the Pennsylvania, using a 40-kc generator and transducer. Cleaning and rinsing tanks each hold 20 gal of chlorothene. This solvent is continuously pumped from the cleaning tank, passed through an automatic distillation unit, and then delivered to the rinsing tank before returning to the cleaning tank.

On the bench where the piston and slide-valve assembly is reconditioned the piston ring is initially checked to determine if it is free. Following dis-

Continued on page 68)



new all-weather plastic coating strips off clean... in seconds!

Slashes journal cleaning costs 30¢ to 50¢ ...keeps journals *wheel-shop* bright!

Freight Liner

PLASTA-GARD

Thirty to 50¢—you save this much on every journal with ADM's new PLASTA-GARD Strippable Plastic Coating. You save this much by eliminating the costly, messy, time-consuming operations of conventional journal cleaning. No scrubbing and wiping with solvent-soaked rags . . . no fire pots in winter to scorch journal

Even after long exposure to sub-zero cold or sizzling sunlight, this super-tough plastic peels off slick and clean in seconds. PLASTA-GARD stays flexible and strippable *permanently* — assures positive all-weather protection against rust and corrosion.

PLASTA-GARD also is ideal protection for drive and other machined-metal surfaces. Since it dries by evaporation (no catalyst is required), PLASTA-GARD can be applied at any temperature. Formulations for brush, spray, and dip-coat application are available. One gallon of PLASTA-GARD provides two-coat protection for about 60 journals . . . positive protection in any climate.

Investigate the important economy and convenience of PLASTA-GARD strip-coating today. Write, wire or call ADM for full information and a product sample.

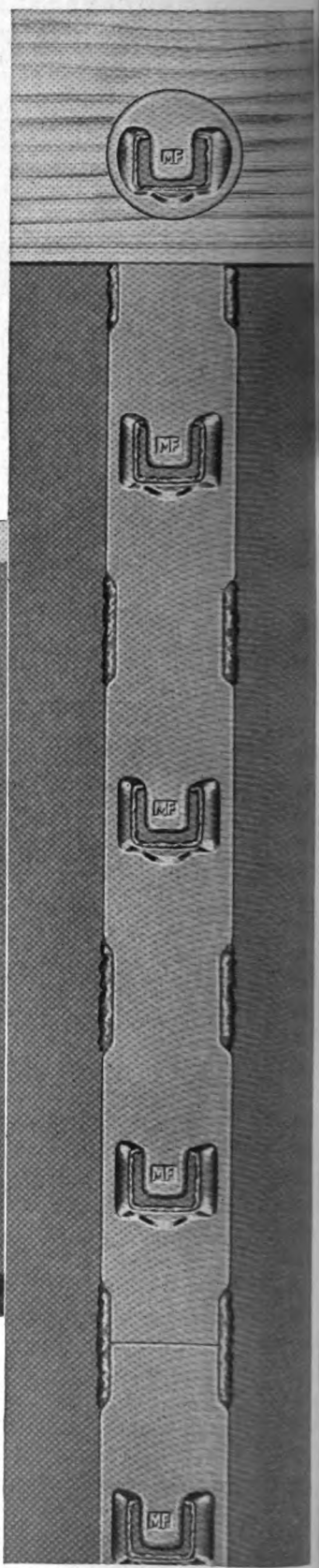


Archer-Daniels-Midland

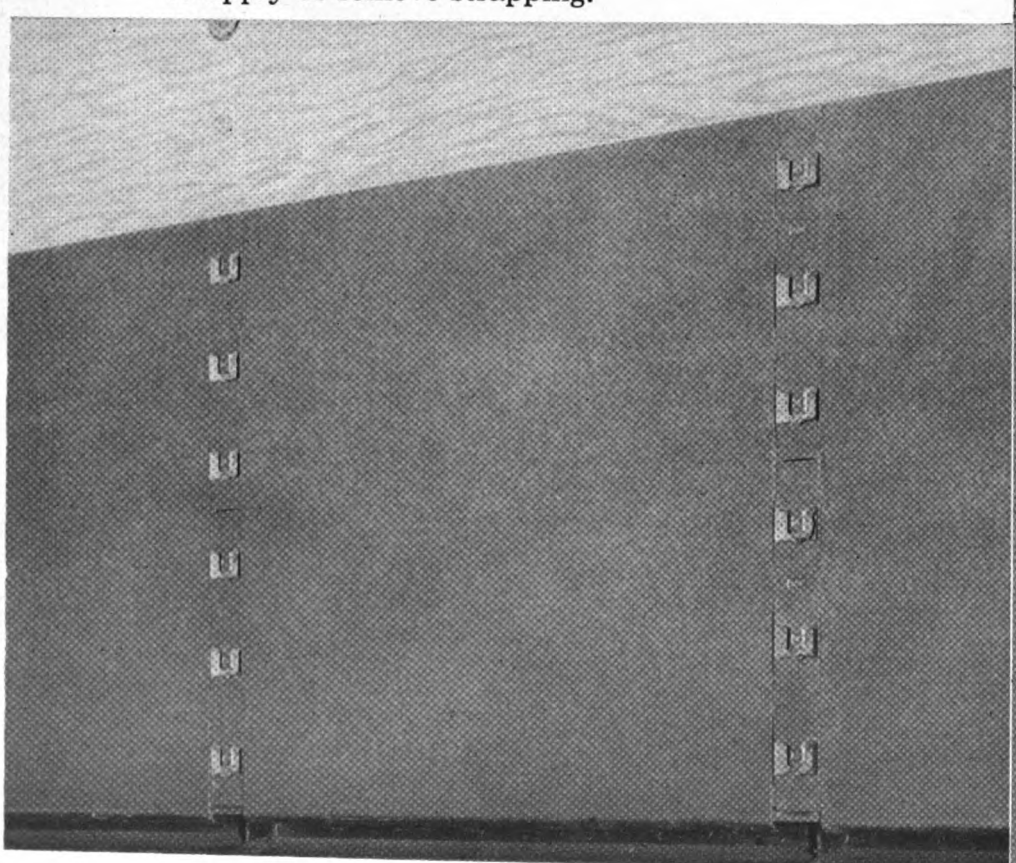
753 Investors Bldg. • Minneapolis, Minn.

FOR STEEL LINING

the M·F continuous bar anchor



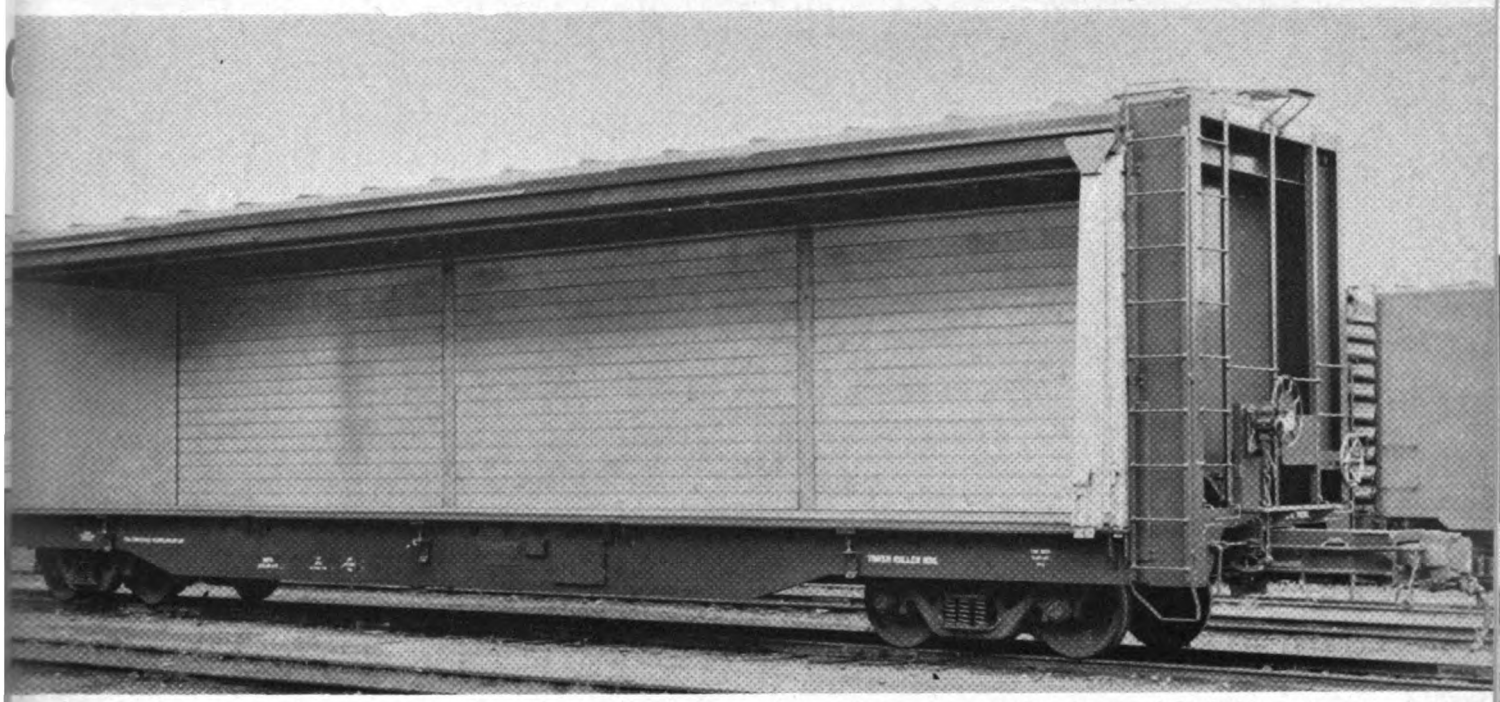
- *Welded to the Z-bar side posts between steel plate sections.*
- Furnished in multiple lengths — any variation of anchor style or location is available.
- M·F patented "tongue" anchors make it *easier* to apply or remove strapping.



AN **M·F** CAR IS A
MAINTENANCE FREE CAR

RPI MEMBER

MACLEAN-FOGG LOCK NUT COMPANY
5535 N. Wolcott Avenue • Chicago 40, Ill. • EDgewater 4-8420
IN CANADA: THE HOLDEN CO., LTD., MONTREAL



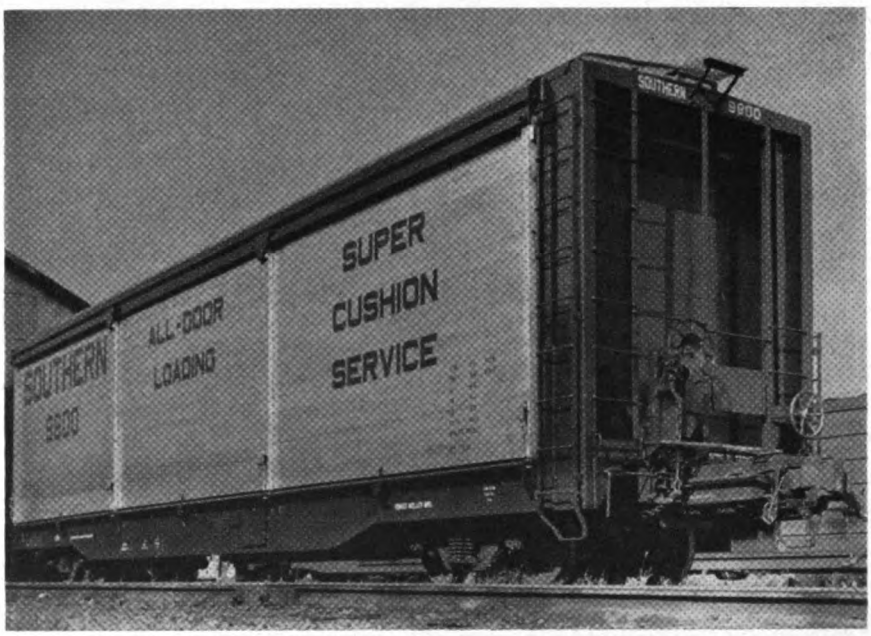
Inside length is 51 ft 10 in. Heavy side sills, roof and ends give structural strength to compensate for absence of fixed side posts.

Satisfying Shipper Requirements . . .

Southern Orders All-Door Box Cars

An all-door box car, recently built for the Southern by Pullman-Standard, is now undergoing service tests on the railroad. The clear door opening is 50 ft 6 in. when the garage-type aluminum side doors are raised into the ceiling and the aluminum door posts rolled to the car ends. Lumber, large machinery, and other hard-to-handle shipments which cannot be easily moved in and out of regular box cars can be loaded quickly from either side of the new car.

From an initial design by the Southern, P-S developed and built the general-purpose, all-door car adapted for mass production. "The new car type was designed and built with the shipper in mind," D. W. Brosnan, Southern's executive vice-president said. "It can be loaded as easily and economically as a flat car and carry its lading safely enclosed."



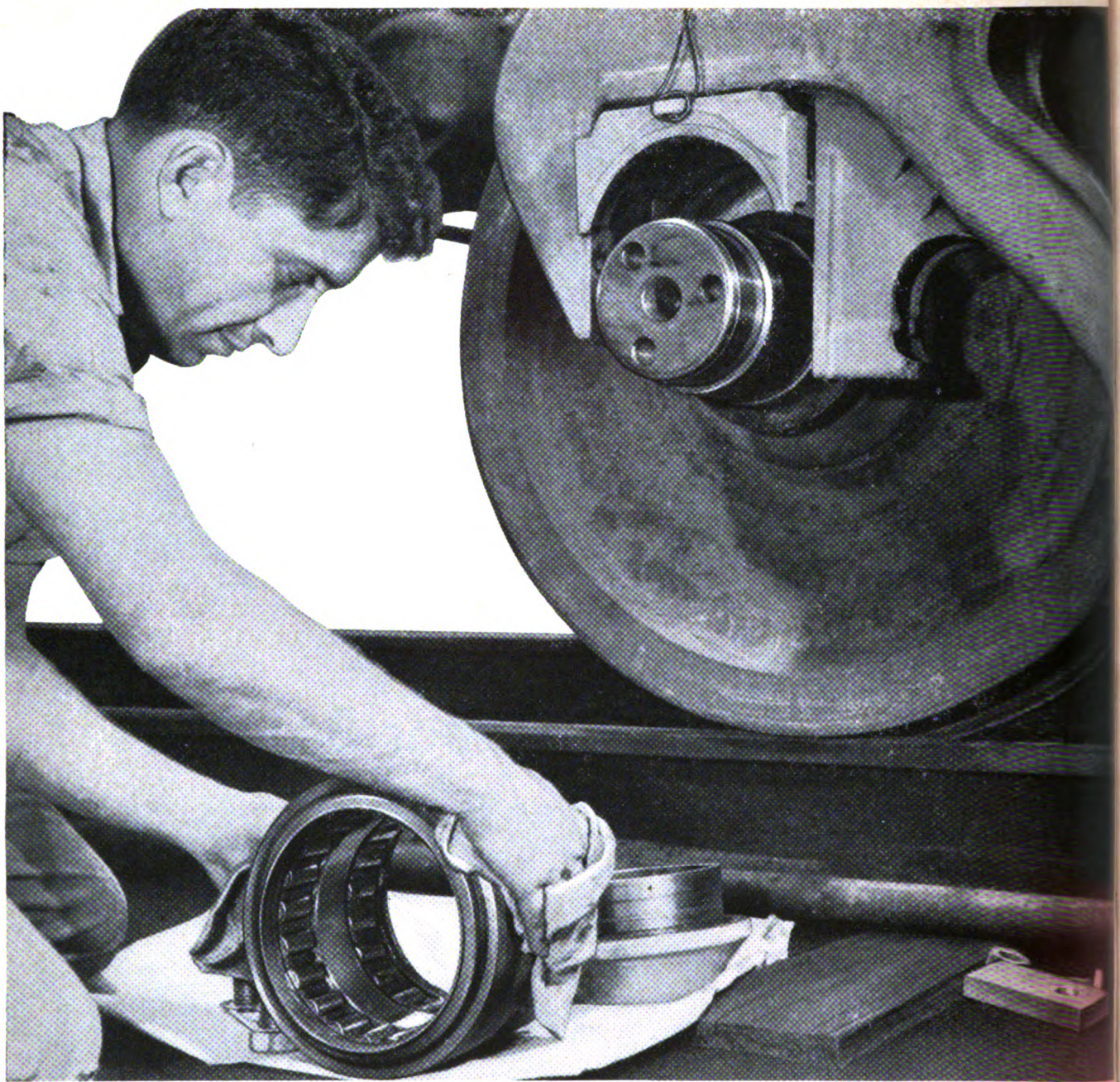
Doors on far side of car are operated by hand-wheel opposite the handbrake wheel. Doors on near side are raised and lowered by wheel at far end of the car.

The car is equipped with P-S Hydroframe-60 cushion underframe, providing 30 in. of hydraulic cushioning in either direction. End piers and reinforcements, sandwich ends, sliding center sill, body bolsters, crossbearers, and roof sheets are high-tensile steel. Remainder of the car structure is open-hearth steel, with all shapes and plates ¼ in. and less in thickness containing a minimum of 0.20% copper. P-S 1¾-in. high-strength nailable-steel flooring is used through the entire length of the car.

The car ends are a welded design. The assembled ends are welded to the pier plate, roof sheets and stationary center sill. The roof consists of ⅛-in. sheets welded to outside angle-type carlines and to the side and end plates. Carlines are spaced on 3-ft 5-in. centers for application of standard lengths of running board.

Each of the six overhead doors is

(Continued on page 68)



See the SKF exhibit at the Allied Railroad Supply Association Convention, Hotel Sherman, Chicago—Sept. 10 through 13 Booths 202, 203 and 204

Car maintenance costs slide to a new low with SKF "EXPEDITER" Roller Bearing Assembly

You can cut the cost of journal bearing inspection and maintenance and increase the efficiency and safety of your equipment by using the SKF "EXPEDITER" freight car roller bearing.

This bearing assembly is inspected and serviced at the car —eliminates the entire time and cost of removing wheels, breaking press fits and completely disassembling the bearing.

To inspect "EXPEDITER," you simply: (1) loop a wire over the side frame to the adapter; (2) jack up the side frame (to take the weight off the bearing); (3) remove cap bolts, plate lock washer and axle cap; (4) slide off the outer assembly by hand. Even the seal can be replaced this easy way, too.

"EXPEDITER" is competitively priced yet offers more features than any other anti-friction bearing. It conforms to all AAR side frame and freight car standards and is interchangeable with other bearing assemblies.

Write for "EXPEDITER" Folder #462.
7360

SKF MOTION ENGINEERING

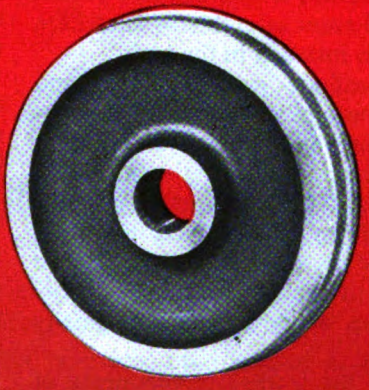
Advanced ball and roller bearing technology



TRAILER TT TRAIN

piggyback cars get

high wheel mileage



with Edgewater rolled-steel multiple-wear wheels

Edgewater multiple-wear wheels provide outstanding performance. Forged from solid steel blocks and rolled on the world's most-powerful wheel rolling mill, they have the dense, uniform grain structure that assures dependable service under heavy loads and high speeds. Their long life enables the user to take full advantage of the reduced maintenance costs offered by roller bearings.

We will be glad to give you facts and figures on the savings possible through the use of Edgewater multiple-wear wheels.

EDGEWATER STEEL COMPANY
P.O. Box 478 Pittsburgh 30, Pa.

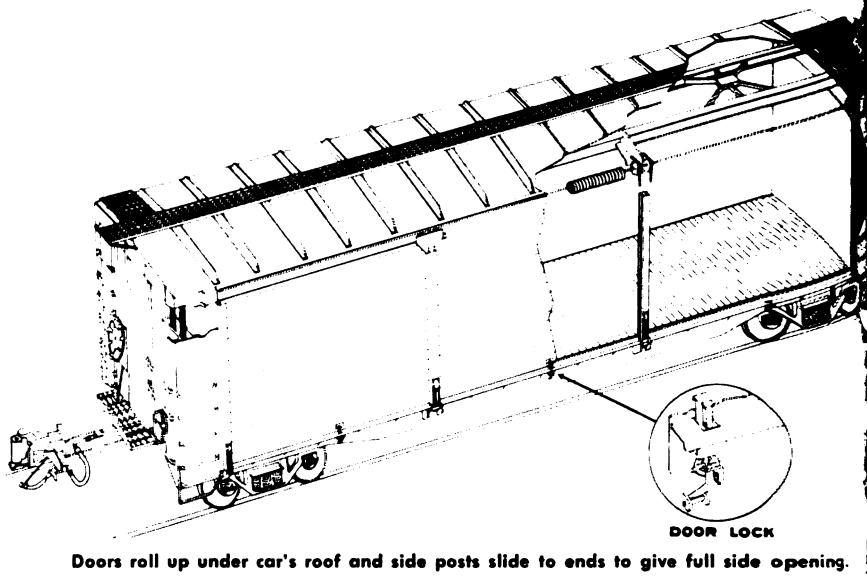
All-Door Box Cars

(Continued from page 65)

17 ft long, made of extruded aluminum sections. Door fixtures consist of heavy duty rollers and door tracks, door balancers, and locks. The four aluminum door posts are suspended by a trolley arrangement attached to the outsides of the side plates. Doors and posts can be swung out at the bottom and doors raised if the lading binds.

Inside height is 9 ft 3 in. and width, 9 ft 4⅛ in. Truck center distance is 41 ft 3 in. The narrow-pedestal type trucks have 3 11/16-in. spring travel and are fitted with Timken roller bearings and Stucki side bearings. Truck brakes are Wabcopac units with Cobra shoes.

Orders have been placed by the Southern for an additional 200 cars, with construction to start in September at the P-S Bessemer, Ala., plant. These will differ from the prototype in that capacity will be increased from 70 to 90 tons and the light weight will be reduced from 100,900 lb to approximately 92,500 lb. Production cars have 36-in., one-wear, heat-tre wheels mounted on 6½ x 12 smo turned axles with raised wheel s



Doors roll up under car's roof and side posts slide to ends to give full side opening.

PRR Brake Shop

(Continued from page 60)

assembly, a reconditioned slide valve is installed in place of the one just removed. The slide valve face has been machine lapped and the graduating valve seat lapped by hand on a lapping bar. The entire piston assembly is then rebuilt, lubricated, and passed to the adjacent assembly bench where it is again installed in the body.

To facilitate gaging, fitting, and seating pistons in the body bushings, the production system is arranged to deliver each piston to this assembly bench so it can be reapplied to the portion from which it was removed. All other parts are processed with no attempt to replace them in the portions from which they were originally taken.

While the internal components of the portions are being cleaned and inspected, the body travels from the disassembly bench to the cleaning and inspection bench where a high degree of mechanization has been achieved. Gasket faces of the portion are brushed automatically. The body remains on the conveyor carrier, and its base slides into a clamp which is mounted on top of a hydraulic cylinder. The cylinder moves the portion between a pair of brushes which clean the pair of opposing gasket faces. Upon the completion of this stroke, a third brush moves back and forth across the quick service limiting valve cover gasket face.

On the emergency portion production line, there is a similar arrangement, except that the third brush cleans the gasket face of the ball check clamps. Upon completion of this brushing, a second cylinder moves the portion into the multiple jet blowing device. Here three separate plates are automatically brought into contact with the three gasket surfaces which have just been brushed. Nozzles in these plates match all of the openings in the portion. Air at 100 psi is blown from the first of these sets of nozzles, while the other two plates are backed away from the portion so that air and dirt will be carried completely out of the passages. In sequence, each of the three plates is brought into contact with the gasket surface. This entire cycle is repeated three times so that each passage in the portion is blown six times, three times from each end.

Flowrator Inspection

The portion is then released from the clamp on the bench and moved to an inspection bench where a machinist uses the standard AAR gages for checking the piston bushing and slide-valve bushing. There is a visual inspection of all these machined surfaces. If bushings are found to be unserviceable, the body is removed f the carrier for return to air brake m ufacturers for renovation.

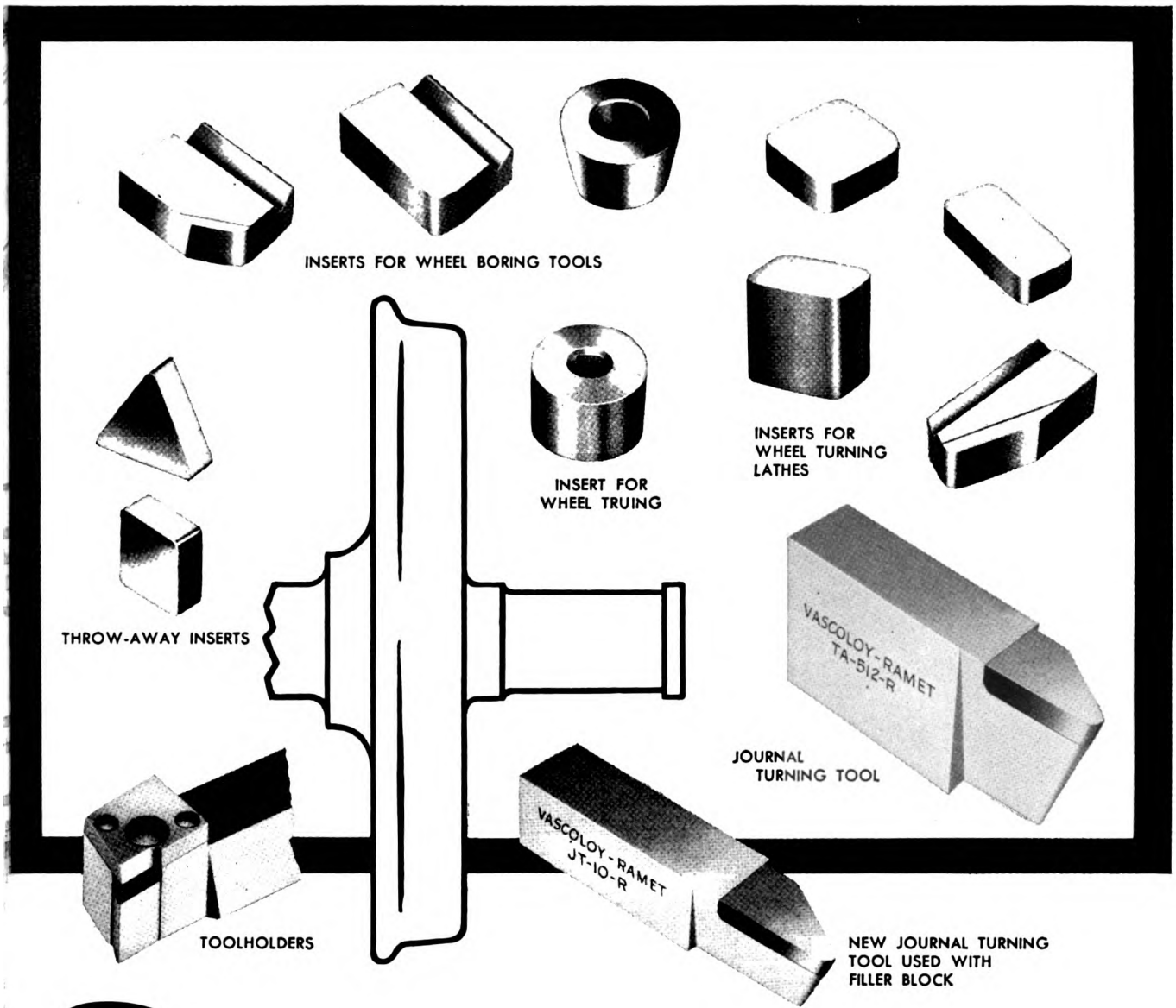
At the next station, another m chinist applies a flatness gage to slide-valve seat. This is a PRR-d oped device incorporating a Flowr which gages flatness by measuring t loss of air along the valve seat. If t Flowrator reading is high, the seat dressed with an air-operated recipr cating tool using fine carborundum f the cutting compound. Another m chinist at this bench installs ch chokes in the body.

The body then continues on t overhead conveyor to the next po tion—the piston and sliding-valve a plication bench—where this rebuilt sembly is installed. At the same tim the bushing slide-valve seat and wi well are lubricated. A resistance ind cator is used to check the friction a sistance of the slide valve and piston

The partially assembled portio then continues on the conveyor to t next bench — the quick-service-lim ing-valve bench. Here a pair of m ple spindle impact wrenches are us for assembling the quick-service-lim ing valve and duplex-release valve third multiple speed wrench is th used to apply these assemblies to t body of the portion.

At the next bench—the back co application bench—a machinist a

(Continued on page 87)



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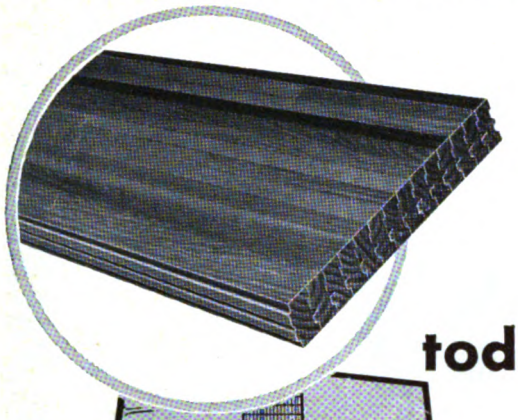
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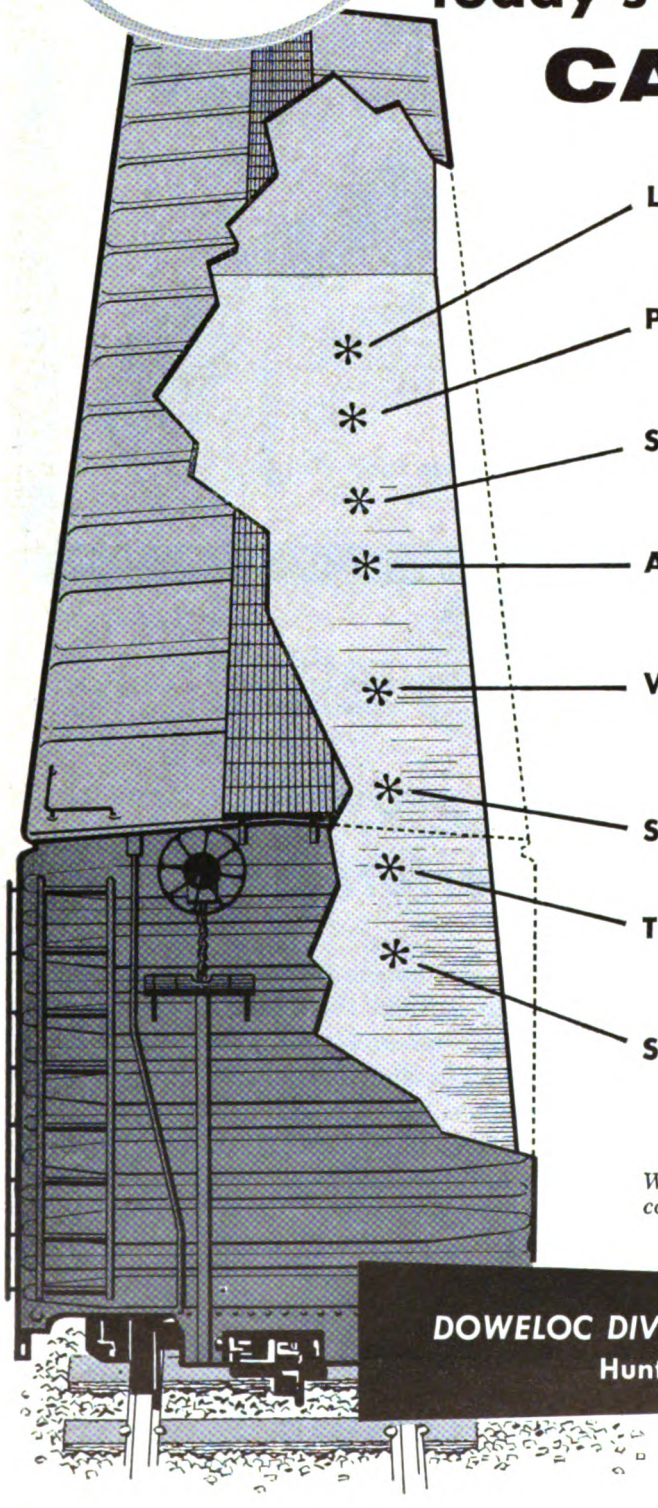
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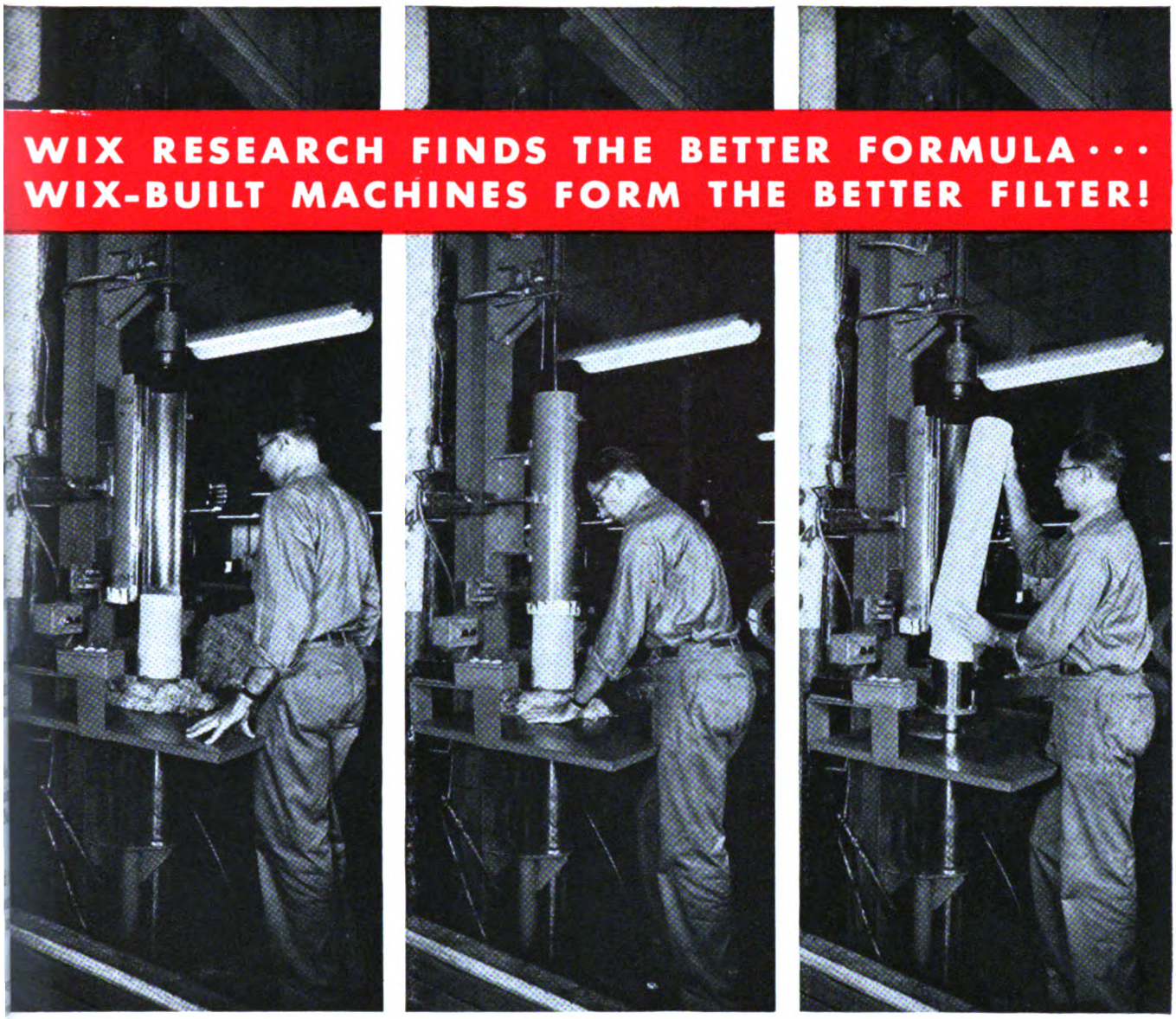
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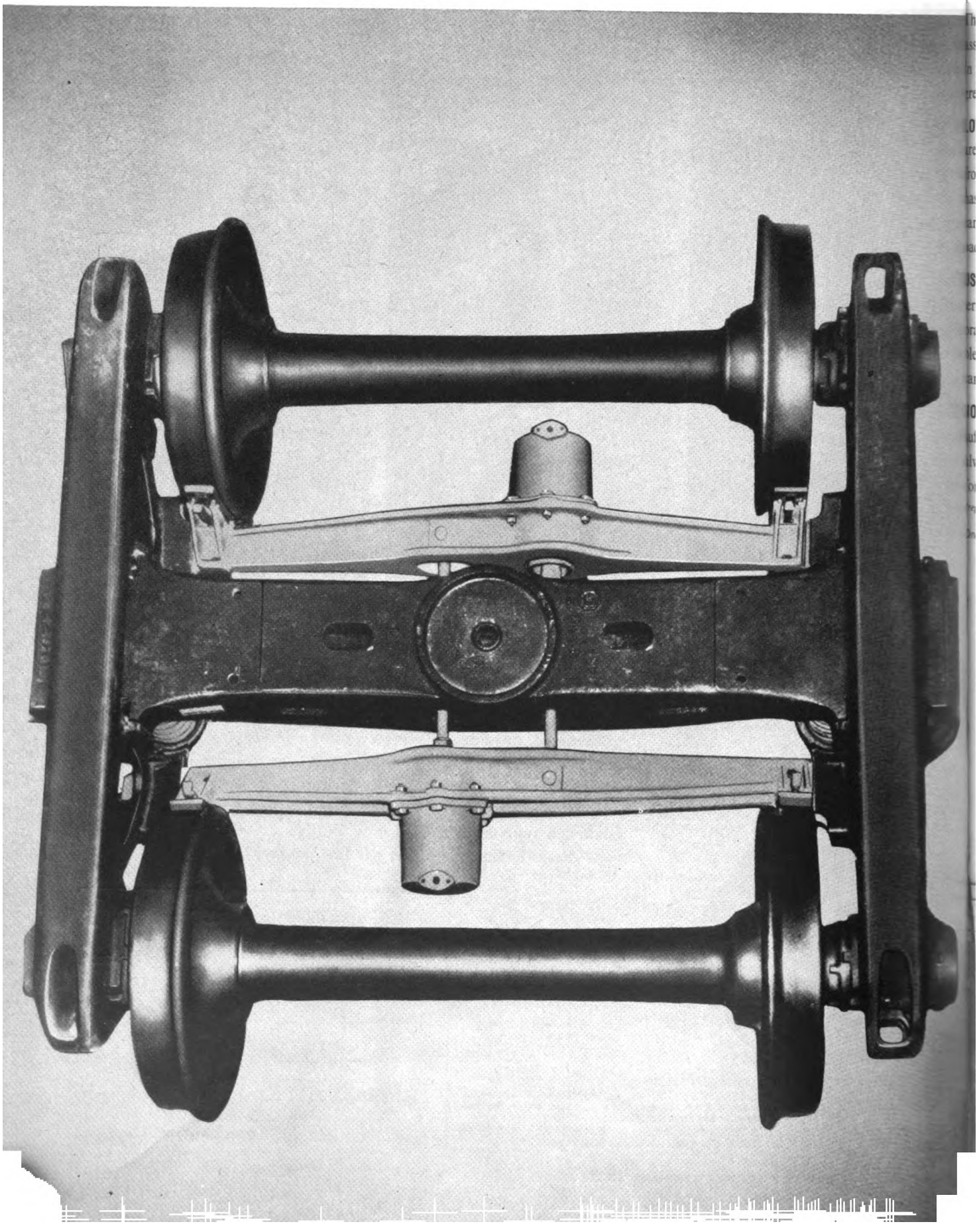
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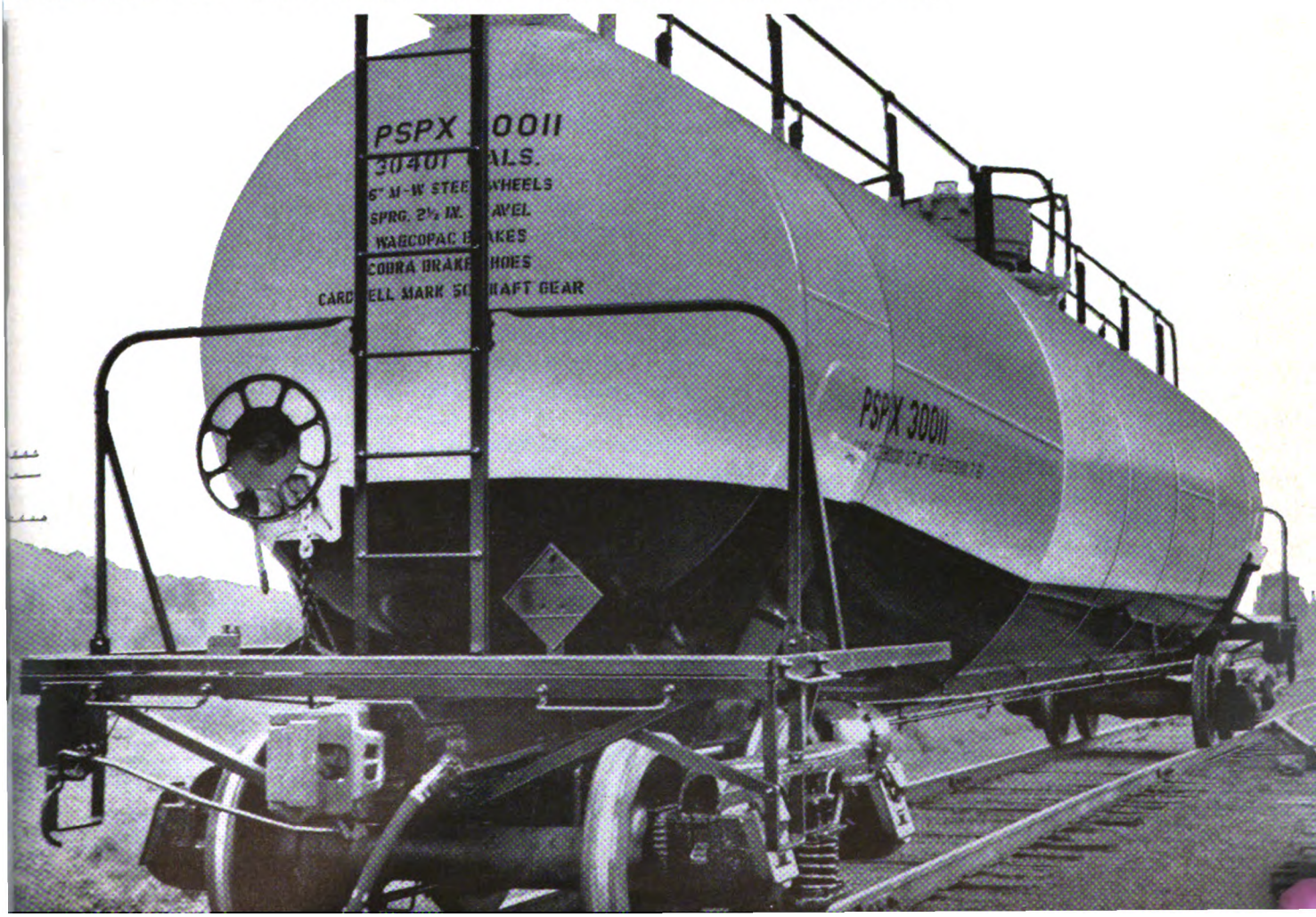
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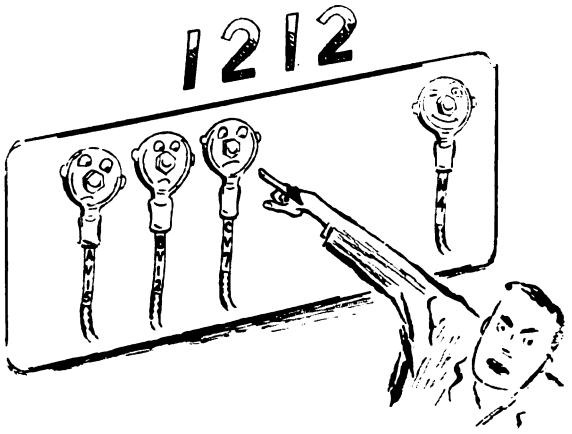
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The Finger of Suspicion



By Gordon Taylor

The four-unit F7 locomotive was at the head of a long freight train starting over the Hill Division. Dan Driver, the engineman, was thinking about a spot in those same hills where he would be hunting the following week.

As Driver pulled the throttle out to eighth position, he sensed that his train was slowing at a spot where it normally should have been picking up speed. A check through the four units showed engine speeds to be very irregular in the two units at the rear. Dan groaned. Already his locomotive was hunting and it certainly meant that this trip would be no picnic for him. "Let's see," he said, "if we can find what's making those engines hunt. This is no place for 3,000 horses to go lame; we need all 6,000 to keep this train on schedule."

The first thing to try was changing jumper cables. This seemed to solve the trouble; the engines on the two rear units resumed normal speed. "It was just a defective jumper cable between units," Dan declared.

His locomotive overruled this decision almost immediately. Again the two rear units were failing to respond properly. Again they acted normally after an exchange of jumper cables.

"This 'come and go' trouble must be due to some defect in the control wiring," Dan said. "It's puzzling that we should get even temporary relief by changing jumper cables. I'll write this case up 'strong' in my trip report for the foreman at Centerville shop." When the locomotive arrived at Centerville, the two rear units had been shut down completely. The train had been reduced to two-unit tonnage and was very late.

Doc Watts, the electrical foreman, hearing about the delays experienced on the trip, declared, "This locomotive will not leave here again until we know definitely that we have corrected the trouble. Let's check recent reports on these units."

The records showed that on the locomotive's previous trip into Centerville the three rear units had been in trouble. At that time a thorough check had revealed nothing. The units were even operated back and forth in the yard. Because that engineman's report had been rather vague, it was thought that some of his statements probably were not too accurate. After no trouble developed during the yard test, the report had been closed with the note "probably defective jumper cable."

"It must be control wiring trouble," Doc said; "inspect and test the control jumpers and receptacles." The receptacles were thoroughly examined; the jumper cables were all tested on the cable testing panel. Circuit continuity of each wire was checked; none of the wires were grounded on the cable plugs.

At that point one of the electricians reminded Doc that on the earlier trip three units had given trouble. On the last trip there had been trouble on only two. It was discovered that, on the former trip, Unit 1212 was second in the consist; on the last trip, it was operating in the third position next to the trailing unit.

"If," said Doc, "the trouble was in the wiring on the 1212, it could have affected three units last time and only two units today. The finger of suspicion points to 1212, but there's still a possibility that trouble in the control wiring bundle somewhere else might interfere with control messages reaching the 1212.

"Irregular speed control could result from such things as an intermittent open circuit in the A, B, or governor control solenoids. This m involve control wires AV15, BV or CV7. Each of them must b suspect. We mustn't overlook a thing that would interfere with the F relay which also controls the A, B, C speed solenoids. I hardly think control cable wire that feeds ER involved. ER is fed from trunk w FP16 which also feeds the fuel pu control on the trailing units. W had no reports of the fuel pumps sh ting down. Let's concentrate on fa that would affect the individual spe control solenoids."

The first test involved the four u connected in the regular manner a with all engines running. Standing the shop, the engine speed con worked perfectly. "Now," said D "let's carefully check the 1212, st ing at the jumper receptacle at one e and going clear through to the rec tacle at the other end."

The receptacle was removed and its wire connections were found to good. It was then decided to check the terminal boards for loose wire co trol connections. The panel over t doorway at the end of the enginero of this B unit was removed, uncov ing the terminal board back of t jumper cable receptacle. Each wi leading from the receptacle to t board was given a slight pull to det mine if it were broken. Attention w then given to the terminal board co nections for wires AV15, BV12, a CV7. There was nothing wrong wi these connections. "I want to kno that every connection on that termi board is clean, tight, and secure," D said.

Here the careful search paid off the connection for the N4 wire w

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

tested. This wire, like the others, had a terminal lug that fitted over a terminal post stud where it was held by a nut and washer.

At some time during rewiring, someone had failed to provide this connection with a lock washer or double nut. Time and vibration had loosened the connection. The burned and corroded terminal was evidence of the heat generated at the loose connection.

As you know, the N4 wire runs through a multiple-unit locomotive when the jumper cables are in place. It serves as the return for all the control circuits. Any fault in the N4 wire can affect the functioning of any control circuit. The loose connection acted to insert resistance temporarily, reducing voltage so that contactors might not close properly, or might drop open if they had closed.

It was no wonder that there had been vague and indefinite reports about this unit. The thing that had fooled everyone, enginemen and maintainers alike, was that sometimes a change of jumper cables seemed to correct the trouble. At those times the locomotive's vibration had decreased so there was enough contact at the terminal board connection to establish a working control circuit.

To prove that the maintainers had found the real source of trouble, Doc had all the units connected for a regular service test. He then mounted a stepladder in Unit 1212 and moved the terminal lug on its post, producing results of the sort the enginemen had described. Doc had the terminal lug replaced with a new one and tightly secured with a new nut and lock washer.

"This case should be a lesson to all of us to be more careful in testing and trouble shooting," Doc reminded his maintainers. "Since this happened I recall that several times in the past the 1212 has been involved in delays and failures which were always said to be the result of defective jumpers. When 3,000 horses went lame several times, just as they were badly needed, it made us realize that we had unusual trouble.

"I know," Doc continued, "that Dan Driver would rather be out with bird hunters than with a hunting engine. We have probably insured that his next hunting episode will be next week when the wild turkey season opens. It shouldn't be on the 1212."

Diesel Hydraulic

(Continued from page 27)

ers, longer rigid wheelbase, lighter axle loading, and almost universal use of roller bearings—made difficult precise comparison with actual running resistance of U.S. trains. While calculations had indicated a speed of 14 mph on the section where uncompensated curves made the resistance equivalent to a grade of 2.7%, the locomotive operated at speeds of 16 to 20 mph with a 965-ton train.

Performance of the hydraulic transmission was watched closely. Automatic changes in operating range are made by a hydraulic control circuit which fills the appropriate converter in response to locomotive and engine speeds. Emptying and filling of the converters is overlapped during changeover to eliminate loss of power; during Semmering tests the change could be spotted on the recording instruments in the dynamometer car, but was virtually impossible to detect otherwise.

The only slippage occurred on wet rail after a night of rain. The automatic sanders were disconnected at the time. U.S. observers later said that the slipping, even under these conditions, was not severe enough to be important.

In March and April dynamometer car tests were made by the German Federal Railroad with one of the Rio Grande locomotives. It is German practice to use braking locomotives instead of an actual test train. This makes possible precise control of loading during tractive-effort tests; the locomotives can also provide power during braking tests.

A maximum starting tractive effort of 106,000 lb was measured with locomotive weight reduced to 152 tons. During the test there was no evidence of transmission or engine overheating.

Using steam locomotives to provide the propelling force, the hydrodynamic brake was tested. The resulting braking curve is a sharp parabola reaching a peak of approximately 47,500 lb at 26 mph. With full braking power, two of the heaviest German steam freight locomotives were unable to accelerate beyond 19 mph when coupled to the diesel-hydraulic locomotive. In another test the locomotive slowed a train of 715 tons from 50 mph to almost a standstill in 875 yd with dynamic braking alone.

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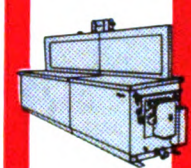
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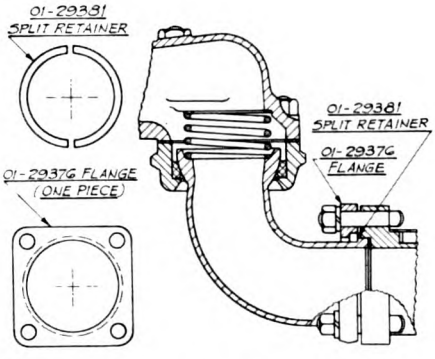
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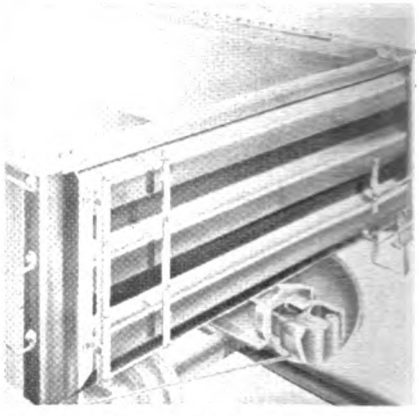
(Continued from page 14)

across the filters. Under continuing use, the pressure drop will increase as much as 15 psig when the filter is loaded to capacity. Over 350 sq ft of positive filtering surface is provided by each kit. Filtering media is unaffected by high temperature, moisture, or viscosity change of the lube oil, and will not interfere with the function of lube-oil additives. *Farr Co., Dept. RLC, 2301 Rosecrans ave., El Segundo, Calif.*



Steam Connection

A solid forged flange with two-piece split retainer ring supersedes the split flange formerly used on Barco 2½-in. steam-heat connections. This change is said to reduce maintenance. *Barco Manufacturing C Dept. RLC, 500-530 North Hough st., Barrington, Ill.*



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The F-B fixed end, said to give mo strength and durability to gondola cars, constructed of 5/16-in. Cor-Ten steel. Er are corrugated from corner post to corn post, and are reinforced with formed V sections welded along the sides where the fit into the corners of the car. The V section, of the same type successfully us in box car ends, not only adds rigidity the ends, but also to the corners of the ca The ends come in standard sizes, weigh about 595 lb each, or can be purchased odd-size widths. *Youngstown Steel C Corp., Dept. RLC, 1600 Hunter st., Nil Ohio.*

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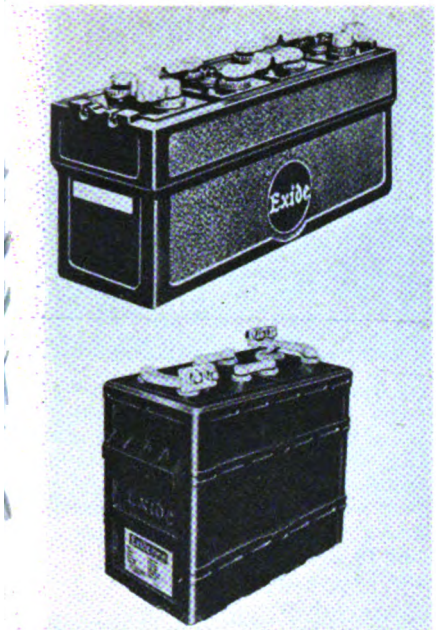
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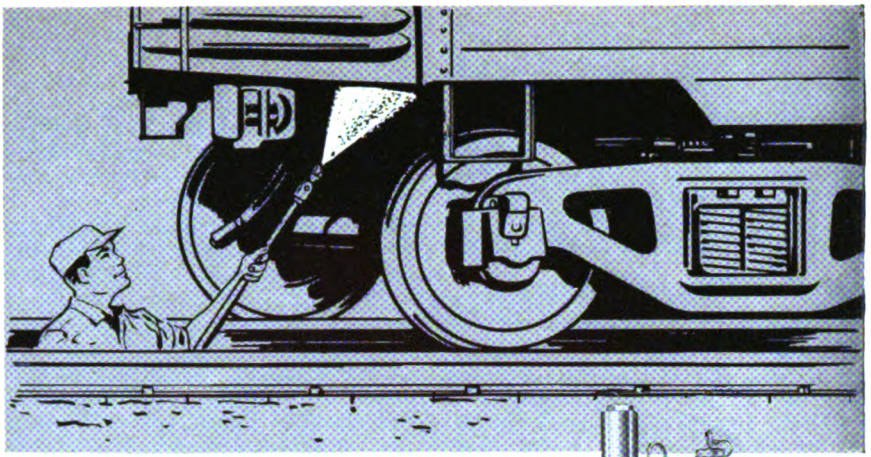
The KGM Exide-Ironclad battery is a low-profile model used for diesel starting as well as for caboose and refrigerator car applications. Its armored porous tubing is said to provide 12% more current capacity than the former Model KX. It is rated at 22.4 amp hr per positive plate and is available in sizes from 63 to 231 AH at the 8-hr rate of discharge. Additional electrolyte (about 1 in.) above the plate is said to reduce maintenance by lengthening the interval between waterings.

The EG Exide-Ironclad, with 25% more electrical capacity than the former EH model, is lighter in weight than any other lead-acid battery of comparable capacity for passenger-car application, saving up to 16 lb per car. *Exide Industrial Marketing Div., Electric Storage Battery Co., Dept. RLC, Rising Sun and Adams aves., Philadelphia 20, Pa.*



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The Model TULCR automobile unloader, "rubber-mounted" on 15-in. wheels and equipped with air brakes and a telescoping tongue. It can be towed by truck or tractor around a macadamized yard and brought up to either end of a car. It can also be used where no spur or dock is available and with the multi-level railroad cars having their lower decks 38 in. above the track. Ramps, manually operated by a 1-in. power wrench or crank, raise up to 14 ft 7 in. Power-operated ramps can be supplied. The hitch of the 16,200-lb unloader can be lifted by one man. Wheels retract hydraulically and rest on adjustable leveling outriggers when in use. *Buck Equipment Corp., Dept. RLC, 720-X Anderson Ferry Road, Cincinnati 38, Ohio.*



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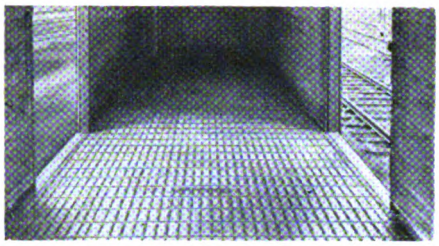
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Nailable Steel Flooring

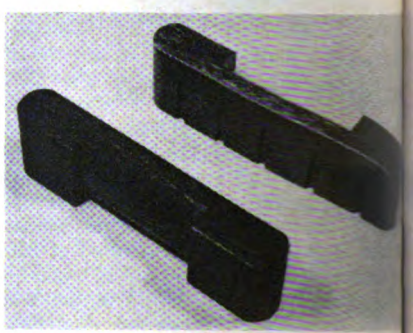
The flat-surface and rib surface styles of Nailable-Steel-Flooring, which combines the strength and durability of steel with the nailing advantages of wood, are available in a variety of gages. The flooring will support the heaviest freight-car loading equipment. It is made of columbium-treated, mild carbon, high-tensile GLX-W steel in 8-in. wide channels welded into panels. The nailing groove permits blocking to be nailed directly to the steel floor. The self-sealing mastic filler in the nailing groove flows together to fill nail holes and remains plastic, keeping floor tight through its life. The flooring can be installed as original equipment or as replacement flooring. *Stran-Steel Corp., Dept. RLC, Detroit 29, Mich.*

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Double sliding flush doors improve mechanized loading and unloading of lumber and other bulky and palletized commodities. The doors, fitted with rubber gaskets,



are flush with the car sides when clo They are locked in closed position braced against bulging loads, and auto ically locked in open position by sp latches. For hauling grain, separate g doors are unnecessary. *Youngstown D Door Co., Dept. RLC, The Arcade, Cl land 14, Ohio.*



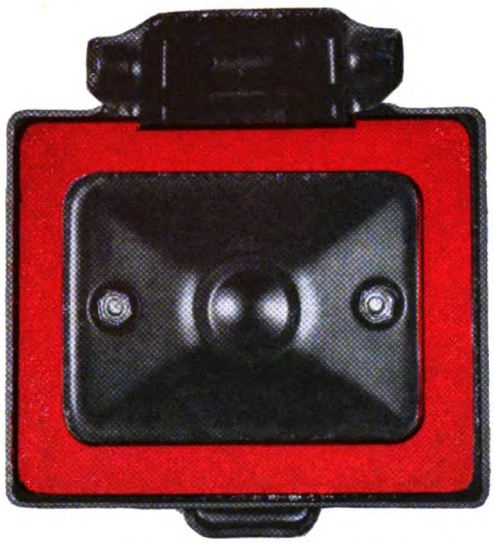
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The George journal stop, made of a n metallic material, is said to be highly sistant to severe impact. It is available two designs—for rib-type boxes (left) a for non-rib type (right). Bolts, sh washers, locking devices, special tools welds are not required for application. stop is being considered by the AAR for in interchange service. *Journal Box Se icing Corp., Dept. RLC, Chicago 4.*



Journal Lubricator

The center feed principle of supplying to the journal is used in the Crest l cator. One-third of the pile fabric c poses a center wick which carries oil f the bottom of the box to the rota journal. Resilient foam in two long dinal pockets assures continuous co between the lubricator and the jou The center wick and the pockets which port it are sewn onto a "pad stabil or base platform made of two layers of absorbent cotton duck fabric. Betw these layers is a thin layer of polyreth



Now Available

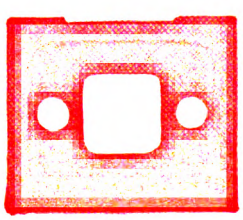
Motor Wheel Journal Box Lids with OIL SEALS

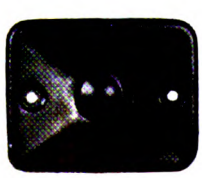
- **Certified by A.A.R. to latest specifications.**
- **Completely Seal Journal Box Face.**
- **Easily Installed and Easily Serviced.**

Exhaustively tested for two years, Motor Wheel Pressed Steel journal box lids with Neoprene seals still provide a complete seal at the end of the tests! One major road now has 1,500 hopper cars equipped with these lids and seals.

Motor Wheel Oil Seals are Neoprene closed cell rubber skin both sides. They are held tightly against the lid by a solid stamped retainer plate, fastened by two standard bolts, nuts and lock washers. Combined with Motor Wheel's exclusive "Constant Pressure" compression spring, 40 to 65 lbs.-per-sq. inch lid pressure makes a complete seal at the face of the journal box.

AVAILABLE in 5 x 9 or 5½ x 10 and 6 x 11 SIZES. Replacement seals and retainers are available from Motor Wheel, and require less than two minutes to install.





Write For New Catalog Of Railway Products

MOTOR WHEEL Corporation
LANSING 3, MICHIGAN

11

National Sales Representative
T-Z RAILWAY EQUIPMENT CO.
8 S. Michigan, Chicago 3, Illinois

CHECK √ DIESEL ENGINE WEAR



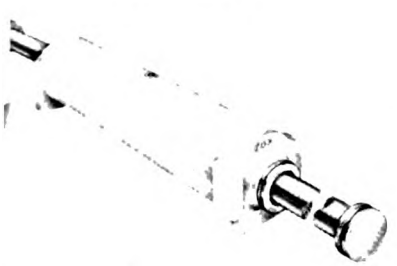
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LET OUR Quantometer Laboratory analyze your Lubricating Oils Accurately for those chemical elements which indicate the presence of Wear Metals, Road Dirt and Water Leaks. **Volume Analyses Handled Efficiently at Surprisingly Low Cost.**

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SPECTROCHEMICAL LABORATORIES, INC.
P. O. Box 8781, Pittsburgh 21, Pa.

1. A 1½-in. wide nylon pull strap at center of the pad is for removing the indicator from the journal box. *Callaway Products, Inc., Railway Products Div., RLC, 295 Fifth ave., New York 16.*



Hydraulic Cushion Underframe

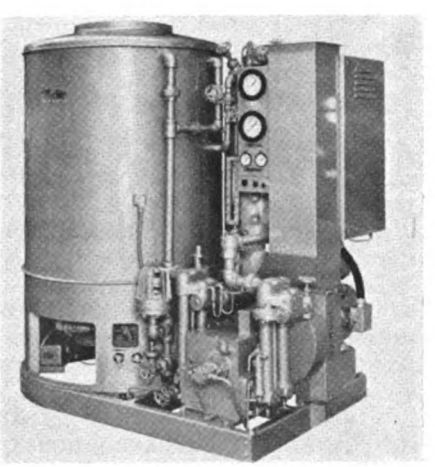
Keystone "20" Shock Control gives protection against lading damage and protects the car by preventing direct transmission of impact energy from the center sill to the car body. The three principal components are a double-acting hydraulic cylinder for absorbing impact energy (above); two sets of return springs (one at each end inside the bolsters), and a floating center sill with up to 20 in. of travel. The sill houses both the hydraulic cylinder and the return springs. Kinetic energy is dissipated in the hydraulic cylinder by the action of a piston forcing oil through several small orifices at high velocity. The underframe can be readily installed in any new freight car without changes or additions that would cause the car to be regarded as special or to be handled in any way other than as standard equipment. *Keystone Railway Equipment Co., Dept. RLC, 80 East Jackson Blvd., Chicago 4.*

Car Lining

The Mortell carliner for upgrading box cars and reefers and for lining trailer interiors is a light tan, prefinished paneling having a smooth, high-gloss surface. It is said to resist abrasion, nailing, and impact without splintering, and can be washed, dry-cleaned or steam cleaned without deterioration. The epoxy coated surface is said to be odorless and non-toxic and will not absorb oil, grease or lamp black. Panels, available in 4- x 8-ft and 4- x 9-ft sheets, are fastened by stapling or nailing. Eleven sheets upgrade a 40-ft box car to 4 ft height. Trimming can be done with a hand or power saw. *Mortell Co., Dept. RLC, Kankakee, Ill.*

Mastic Spray Unit

The "airless" Hydra-Mastic spray unit is a completely new system for continuous spraying of filler-type mastics. Plastisols, asphalt base coatings, and mastic compounds can be sprayed with a single hose. *Gray Co., Dept. RLC, 60 11th ave., N.E., Minneapolis, Minn.*



Steam Generator

The Clayton steam generator is available in five models in capacities of 500, 1,000 1,650, 3,000, and 5,000 lb of steam per hour. It is of the forced circulation, balanced feed, single water-tube design arranged for complete automatic operation. A minimum performance test of 80%, and a 75% minimum thermal efficiency under variable altitude conditions is attainable, according to the manufacturer. Automatic controls for the regulation of steam, fuel, and water pressure are said to prevent superheating which results in melted hose connections. Safety controls are provided for excessive steam pressure, low water, electric.

(Continued on page 81)

Frost's *Insulcote!*





UNION PACIFIC
IS ONE OF MANY
USERS OF
FROST'S INSULCOTE

Here's the practical, economical way to prevent sweat damage to lading...

Now it is possible to apply a quick, economical coating to metal boxcar roofs that will assure a permanently dry surface.

Insulcote, an emulsion-type plastic coating for metal boxcar roofs, actually *absorbs* moisture preventing condensation that can result in sweat damage.

Insulcote bonds to galvanized metal surfaces under any conditions . . . without preliminary acid treatment of surface. It is not affected by mineral solvents and fumes.

Another big advantage of Insulcote is ease of application. One man can undercoat the roof of a 40-foot boxcar in less than 15 minutes. Insulcote can be applied with heavy-duty spray gun equipment. It is safe and clean . . . and presents no fire hazard.

Available in 5-gallon steel pails and 55-gallon open-head steel drums. Write for free booklet.

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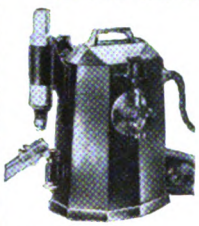
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SURE-FOOT Non-Slip Paint **FROSCOTE** Floor Covering

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Precision NOZZLE RECONDITIONING

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HARTRIDGE NOZZLE MICROSCOPE
Designed for quick, close inspection of all standard nozzle needle and body seat by reflected light. Eliminates time spent trying to recondition worthless nozzles and trial testing.



HARTRIDGE NOZZLE MULTICLEAN
Combines oil and air cleaning in a double flushing operation. Accommodates all nozzles from the small, popular type to large marine sizes. Illuminated magnifying glass for close inspection of spray holes.



HARTRIDGE NOZZLE RAPIDLAP
Provides a high-[illegible] seat lapping [illegible] with Hartridge [illegible] and lapping compo[illegible] Ideal for [illegible] precision injec[illegible] parts. Dual spin[illegible] give two lap[illegible] speeds. Quick-act[illegible] key-less chucks. S[illegible] els on base. D[illegible] head moves to t[illegible] positions.

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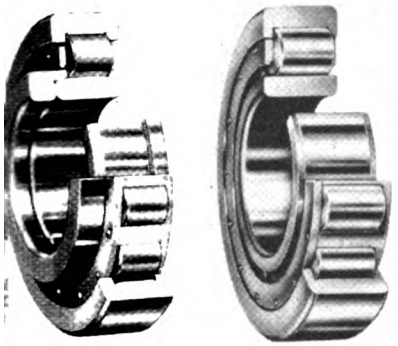
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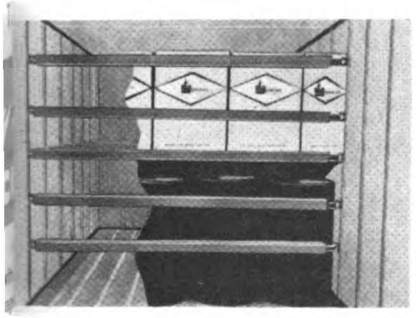
(Continued from page 79)

:l or combustion failure. The combustion amber and jacket are air cooled. The gen- ıtors are said to be in railway diesel-elec- : heating service in the United States and /eral foreign countries. *Clayton Manu- :turing Co., Dept. RLC, P.O. Box 550, Monte, Calif.*



action-Motor Bearings

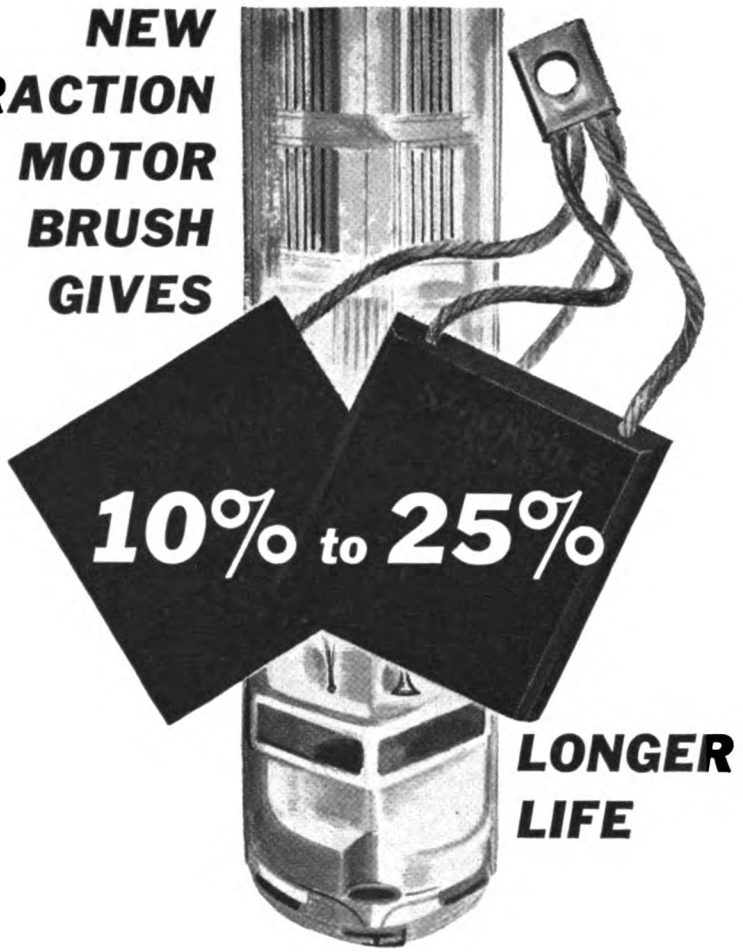
e improved "Hi-Miler" commutator end ıring (left) and the pinion end bearing ght) feature "high-arc" cage contact, ered flange, and a "micro-smooth" sur- e finish. The high-arc contact is said to ɔrove lubrication of the cage, eliminate e wedging between rollers, and cause bearings to run smoother and at lower ıperature. The tapered flange improves ɔacity for all thrust conditions and gives re effective lubrication and lower oper- ıg temperatures. With the micro-smooth face finish, bearings run at lower tem- ıatures and can be operated at high eds without thinning of the lubricant. *F Industries, Inc., Dept. RLC, Front st. Erie ave., Philadelphia 32, Pa.*



eight Bracing System

ight bracing systems to prevent in- ısit damage include standard aluminum rails, "built-in" aluminum (illustrated), steel arrangements. In the standard em the aluminum belt rails are secured he side posts of a truck trailer. The s are punched with a row of holes into ch cross-members are fastened. They nd across the width of the truck. In the t-in aluminum system the belt rails re- e regular side posts. These posts give port strength to walls and roof; receive ss-members to brace against loads, and added interior width over ordinary ler construction. Steel belt rails are l in the steel system which is used when ght is not a critical factor. These rails

NEW TRACTION MOTOR BRUSH GIVES



LONGER LIFE

. . . regardless of operating duty

It's one thing when a new brush grade shows significantly longer life and improved commutation for one type of service.

It's remarkable when this same brush outperforms other brushes in *every* type of service!

But Stackpole Grade AC-35 traction motor brushes do just that. They have been tested on locomotives throughout the country for over two years—in freight and passenger duty, long and short hauls, mountainous and flat terrains.

Throughout the tests improvements in brush life using AC-35 averaged 10% to 25% above even the best "restricted duty" brushes previously used . . . and with equally gratifying reductions in commutator maintenance.

Based on brush costs-per-mile, commutator reconditioning costs, and possible elimination of duty restrictions, Stackpole Grade AC-35 offers a significant opportunity to keep diesel-electrics running . . .



profitably.

STACKPOLE

diesel-electric **BRUSHES**

STACKPOLE CARBON CO. St. Marys, Penna.

AAF AMER-kleen air filters do a better job at lower cost on engine intakes and carbodies



REPLACEABLE GLASS FIBER FILTERS PROVE SUPERIORITY IN RAILROAD SERVICE

On-the-job operation in locomotives has clearly demonstrated these three major competitive benefits of AMER-kleen air filters:

1. *LOWER INITIAL COST.* The cost of metal panel filters is at least 70% more than for AMER-kleen retaining frames.
2. *LOWER FILTER OPERATING COST.* It's far less expensive to replace AMER-kleen glass fiber media at regular intervals than to wash and re-oil metal filters.
3. *LOWER LOCOMOTIVE MAINTENANCE COSTS.* AMER-kleen allows far less dirt (about half that of metal filters) to get to — and into — your equipment.

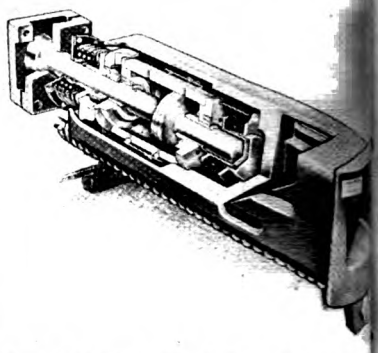
ONLY AAF MAKES ALL KINDS. AAF makes all three types of filters used in engine intake and carbody service — metal, oil bath and AMER-kleen. We *recommend* AMER-kleen, and we think you'll *demand* AMER-kleen when you know all the facts. Write for a free copy of AMER-kleen Bulletin 125. Address: J. K. Sparrow, Engine & Compressor Department, American Air Filter Company, Inc., 348 Central Avenue, Louisville, Kentucky.

See the Amer-kleen display at the Convention—booth 26

AAF American Air Filter

BETTER AIR IS OUR BUSINESS

have slotted grooves into which cross-m
ber end fittings are fitted. *Sparton C
Dept. RLC, Jackson, Mich.*



Hydraulic Cushioning Devi

The FreightMaster hydraulic cushioning
vice can be installed in the draft-sill
on old and new freight cars. The de
employs a double-action energy absor
principle based on conversion of im
shock into controlled directional mover
and offers specific weight and cost ad
tages for specialized and standard fr
cars. AAR conditional approval has
assigned the FreightMaster, which alr
has been used extensively on several m
roads. *FreightMaster, a division of H
burton Co., Dept. RLC, Fort Worth,*



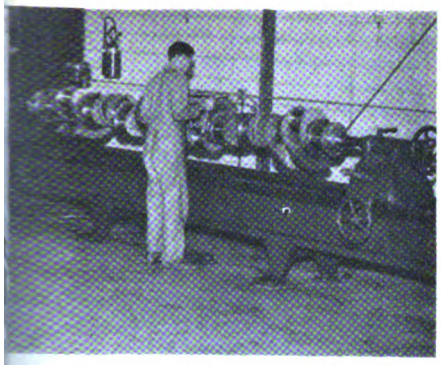
Parts Catcher

A parts catcher, applicable to most di
engines, can be installed in exhaust m
folds to prevent damage to turbo-char
from broken engine parts, such as va
and pistons. Its use is also said to imp
air-flow characteristics, helping boost
bocharger pressure. The catcher is desig
of nickel-bonded, heat-resistant, stainl
steel alloys, and is ceramic insulated.

Complete stainless-steel manifolds
also available for General Electric 8-
inder; Baldwin 8-cylinder, and Alco
12-cylinder diesel engines. *Stainless S
Products, Inc., Dept. RLC, 2980 N.
Fernando Blvd., Burbank, Calif.*

Crankshaft Refinishing

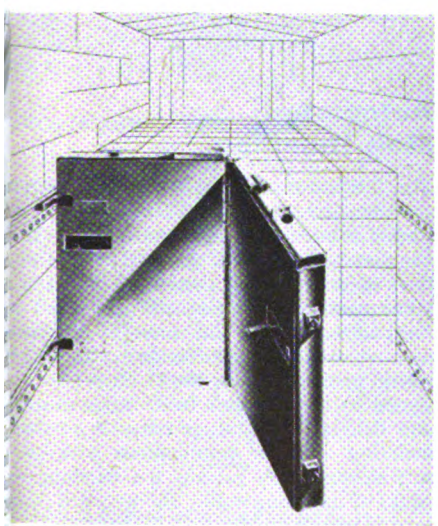
Industrial hard chrome plating and as
ated refinishing processes make it possibl
recondition damaged and worn engine



mpressor crankshafts, camshafts, and nilar locomotive components. Hard rome plate, actually a layer of chromium etal bonded metallurgically with the base etal, is said to have high resistance to ear, low frictional characteristics, corro-on resistance, and good lubricating qual-es. It is said that chrome-plated crank-afts serve longer than original shafts and e reconditioning process costs only a frac-on of the price of a new shaft. Shafts are stored to new shaft condition by straight-ing, peening, plating, grinding, and bal-icing. *Chrome Crankshaft Co. of Illinois, ept. RLC, 6010 S. New England ave., hicago 38.*

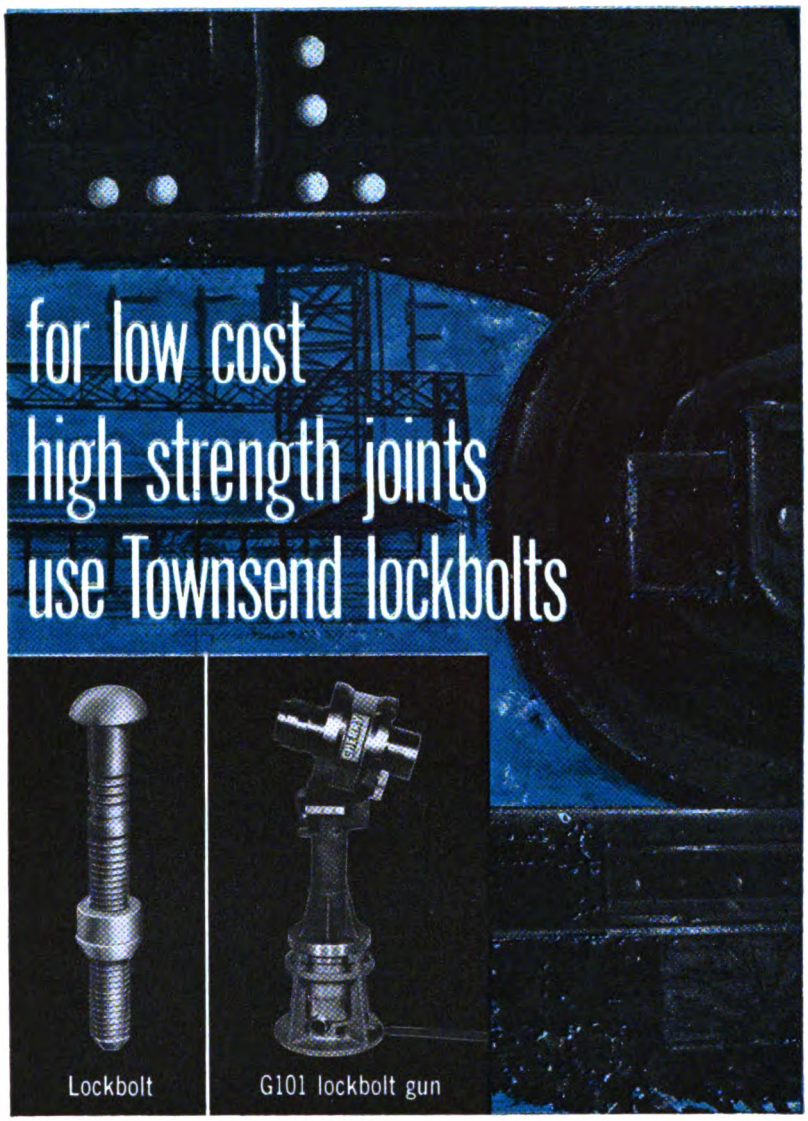
peed Recorder nd Indicator

he DPC 85 recorder and DSC 85 indi-ator, which register 0-85 mph, have been dded to the 0-75, 10-90, 10-100 and 10-120 arco line. Another addition is an instru-ient glow light which provides an adjust-ient for regulating the light on the recorder ial to suit conditions. A bull's-eye oil evel gage is now applied on the front of all peed recorders and indicators. *Barco Man-facturing Co., Dept. RLC, 500-530 North lough st., Harrington, Ill.*



Box-Car Bulkhead

The Rollok fold-a-way bulkheads for box cars operate basically on the same principle as those for gondolas. The 6-ft high bulk-heads can be folded in half. Upper and lower T-hinged trolleys, each with two 3-in.



New car builders and repair shops get uniform, vibration-proof, secure joints at low installed cost with Townsend lockbolts.*

Townsend lockbolts are easy to install with a 2 or 3 man crew. Ordinary type fasteners require larger, more costly, highly specialized crews. Increased driving speed and the elimination of fitting-up operations step-up production. Worker fatigue is minimized.

A demonstration—in your office or on the production line—can be easily arranged. Our field engineer will demonstrate the practical and long lasting benefits of Townsend lockbolts. Write Townsend Company, Engineered Fasteners Division, P. O. Box 71, RR. Ellwood City, Pennsylvania.

*Licensed under Huck patents RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049; and 2,754,703.

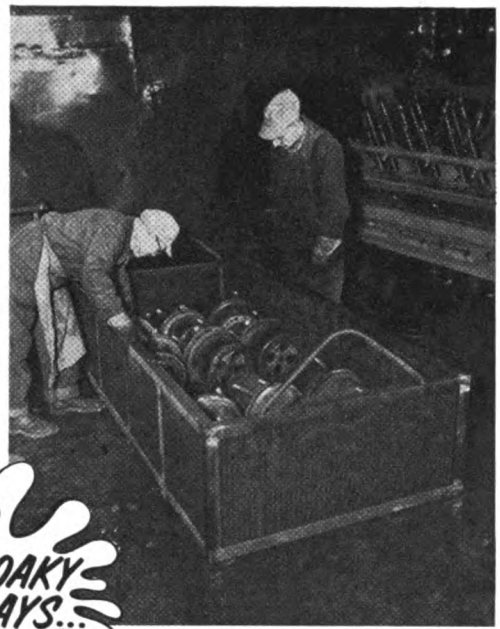
Townsend Company

ESTABLISHED 1816

Engineered Fasteners Division

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LIX IT!

You can clean vital engine parts faster with LIX Cleaners because they are specially compounded for removing tough, burned-on carbon, grit and grime. Soil soaks away with amazing speed... and less costly too, because LIX Cleaners last longer due to less-frequent changes. LIX Cleaners are safe to use—they're low in toxicity and are not a fire hazard.

Scraping and brushing are eliminated... LIX simply soaks away the dirt, and leaves no granular deposits... even reduces after-rusting.

In cleaning pistons, liners, lube oil coolers, fuel injectors, exterior surfaces... anything on the diesel... you'll be money ahead if you use a LIX Diesel Cleaner. Available both chlorinated and non-chlorinated, for spray or tank type use.

SEE FOR YOURSELF how **LIX** can help you save money. Write or call for a **LIX DEMONSTRATION** in your shop ... no obligation.

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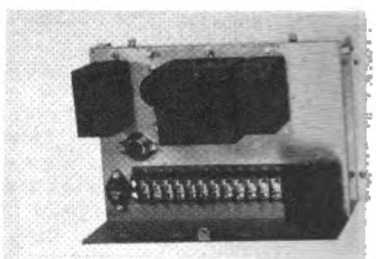
THE Lix CORPORATION OF MISSOURI

WAREHOUSES AND OFFICES:
300 West 80th Street • Kansas City, Missouri
201 Railroad Avenue • Corona, California
82 Wall Street • New York, New York

(3076)



wheels with roller bearings, are fitted at [illegible] end of each bulkhead. Trolleys roll on 3-[illegible] 9-lb structural channels fitted flush into t[illegible] sides of the car. The bulkhead is locked [illegible] the rail by a formed U-channel welded on[illegible] the 3-in. channels. Positioning and lock[illegible] can be handled by one man. *Youngstow[illegible] Steel Car Corp., Dept. RLC, P.O. Box 2[illegible] Niles, Ohio.*



Temperature Controls

A solid state engine water temperature c[illegible] trol system (above) for use on locomo[illegible] engine cooling systems utilizes magn[illegible] amplication and transistorized circuitry has no moving parts and its operation said to be maintenance free. The u[illegible] which can be obtained for up to four f[illegible] employs a thermistor probe sensing t[illegible] ment.

A four-channel temperature control s[illegible] tem using solid state devices is said to a[illegible] curately control the interior temperature refrigerator cars regardless of outside co[illegible] ditions. It utilizes a magnetic pre-amplifi[illegible] static inverter, transistorized power supp[illegible] and transistor switching circuits.

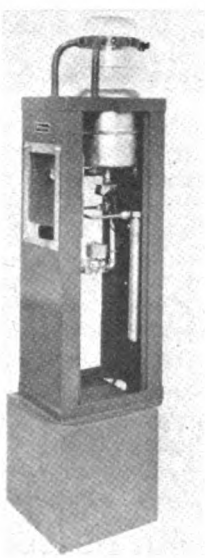
The solid state commuter car temper[illegible] ture control eliminates intermediary p[illegible] relays and contains no moving parts. It e[illegible] ables temperature sensitive mercury t[illegible] to switch heavy duty electrical contact[illegible] controlling strip heaters, and is designed for easy interchangeability. *Vapor Hea[illegible] Corp., Dept. RLC, 80 East Jackson Bl[illegible] Chicago 4.*

Automated Mail Handling

The GE automated mail handling syst[illegible] can be designed, manufactured, and i[illegible] stalled to meet varying requirements. [illegible] completely integrated, providing a smo[illegible] flow of mail with a minimum of ma[illegible] labor needed to handle and sort mail [illegible] railroad terminals. The conveyors are s[illegible] to move mail from car door to car door [illegible] within prescribed time limits. It is also [illegible] signed to receive mail from other sou[illegible] and deliver it to storage cars. A pre-[illegible] metering slide in combination with [illegible] sort storage belts permits the handling peaks of incoming mail. The uncoded pa[illegible] load is stored on the storage belts and [illegible] leased to the sorting system when pe[illegible] have passed. The Directo-Matic con[illegible] consists of transistorized static elemen[illegible] which control the air-operated loadin[illegible] hoppers and diverters. *General Elec[illegible] Co., Industry Control Dept., Dept. RL[illegible] Salem, Va.*

heel Slip Control

neumatic wheel slip control, which can added to any locomotive air-brake equipnt to control slip with no appreciable in tractive effort, operates in response an electric signal from existing slip deion systems. The minimum brake applion necessary to restore the speed of the of slipping wheels to normal wheelspeed is initiated very rapidly and then ckly released. The light brake applicaı reconditions the treads of the wheels hat adhesion will be improved, reducing possibility of repeated slips. The acı occurs only on the unit with the slipping eels. Power delivered to traction motors educed in the traditional manner only en the frequency and duration of reurring slips exceed the predetermined ng of a pneumatic timing circuit. Basic ipment to be added to the locomotive sists of a wheel slip controller, a double ck valve, and two relay valves. *New k Air Brake Co., Dept. RLC, 230 Park ., New York 17.*

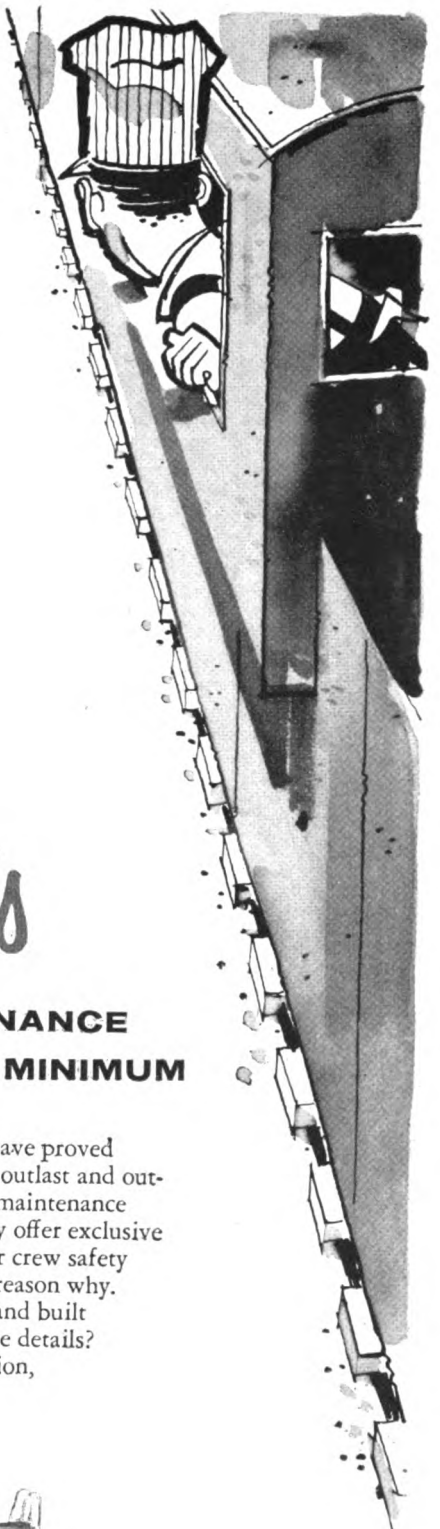


comotive Water Cooler

Vortacool, a water cooler, has no movparts. It operates completely on comsed air and needs only 2 to 6 cu ft of per min. It is adaptable to the comsor of a locomotive that reaches a low ut of 100 cu ft of air a min when en- is idling. Temperature can be regu1 from 27 deg below zero to 400 deg ve. The technique is under study for ible use in mechanical reefers. *Cleve- Technical Center, Dept. RLC, Collind, Cleveland, Ohio.*

nsportation Insulation

330T transportation insulation, after an nsive immersion, freezing and thawing by Freuhauf Trailer Co., is said to have vn excellent slump resistance and thick- retention. After a 12-cycle MDT vibra- resistance test covering a period of



NEW Power Windshield Washer

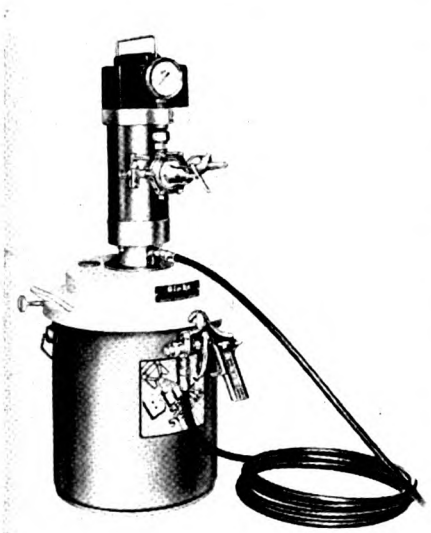
- **Automatically purges lines both before and after fluid application.**
- **Positive protection against freezing and clogging.**
- **Compressed air operated—engineered for heavy duty service.**

By the makers of famous AIR-PUSH Heavy Duty Windshield Wipers

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seven weeks, the insulation showed no sagging, loss of thickness, or disintegration, according to the manufacturer. *Owens-Corning Fiberglas Corp., Dept. RLC, Toledo 1, Ohio.*



Binks Airless Painting Outfit



Gray Airless Spray Equipment

Paint Spray Equipment

The illustrations for the Binks and Gray painting equipment were inadvertently transposed in our July and August issues. The Gray airless spray equipment is described on page 57 of the July issue; the Binks airless painting outfit, on page 10 of the August issue.

Personal Mention

(Continued from page 7)

engineer, general offices. A. A. RICHTER, engineer of mechanical equipment, office of mechanical engineer, appointed assistant superintendent, Como shops, succeeding Mr. Krohne.

Santa Fe.—*Topeka, Kan.:* H. N. CHASTAIN, appointed general assistant mechanical department. Formerly master mechanic at Argntine, Kan.. E. G. SANDERS, general motive power assistant, retired. L. N. PETTERSON, air brake and steam heat instructor, retired.

Seaboard Air Line.—*Savannah, Ga.:* J. R. BISSETT, general road foreman of engines, retired.

Southern.—*Birmingham, Ala.:* JOHN GERSON, JR., appointed master mechanic. Formerly master mechanic at Columbia, S. C. MURRAY C. PAYNE appointed road foreman of engines.

Supply Trade Notes

AMERICAN STEEL FOUNDRIES, TRANSPORTATION EQUIPMENT DIVISION.—*Gordon L. Kibbey,* sales engineer, appointed sales agent.

■

MOTOR COILS MANFACTURING CO.—*Carl F. Steinbrink* appointed consulting engineer. Mr. Steinbrink was general electrical foreman at Rock Island Silvis shops at the time of his retirement in April.

■

NATIONAL LOCK WASHER CO.—*Albert Schiffers, Jr.,* 332 S. Michigan Ave., Chicago 4, appointed sales representative in Illinois, Indiana, Iowa, Michigan, and Wisconsin.

■

RUSSELL, BURDSALL & WARD BOLT & NUT CO.—*Sintered Products Division* for manufacture or powder metal parts established.

■

CHICAGO PNEUMATIC TOOL CO.—*Norman Readman* elected president to succeed *Guy J. Coffey,* now chairman of the board and chief executive officer.



Eads Johnson, Jr.
American Brake Shoe



R. B. Miller
Chicago Pneumatic To

AMERICAN BRAKE SHOE CO.—*Ea Johnson,* Jr., named first vice-presiden Railroad Products Division. Mr. Johnso formerly vice-president of sales for the d vision.

■

CHICAGO PNEUMATIC TOOL CO.—*R B. Miller* appointed general sales manage with headquarters at New York.

■

OAKITE PRODUCTS, INC.—*Roger R Heroux* appointed New England divisio manager, succeeding *Robert P. Jones* who has been assigned to New York headqua ters.

■

SKF INDUSTRIES.—Sales responsibili for railroad journal bearings transferre from regional sales offices to enlarged rail way sales department. *G. M. Goodloe, R G. Moore, R. A. Harwick,* and *W. H Mowers* appointed railway field sales en gineers. Messrs. Goodloe and Moore w be headquartered at Central sales regio office in Chicago. Mr. Harwick will serv Southeast territory from Philadelphia, P and Mr. Mowers, Northeast territory fro New York.

■

HUCK MANUFACTURING CO. — Re gional offices opened at 576 Armour Circle Atlanta, Ga.-*Wynn W. Hunt,* manager; 40 Delancy st., Newark, N. J.-*A. Joe Upto* manager; 7452 N. Harlem ave., Chicago *Allen R. Tenny,* manager; 7849 N. Lind bergh Blvd., Hazelwood, Mo.-*R. V. Clute* manager.

OBITUARY

ORLIN H. CLARK, field manager of th railway division of Oakite Products, Inc. died of pneumonia on July 21.

RR Brake Shop

(Continued from page 68)

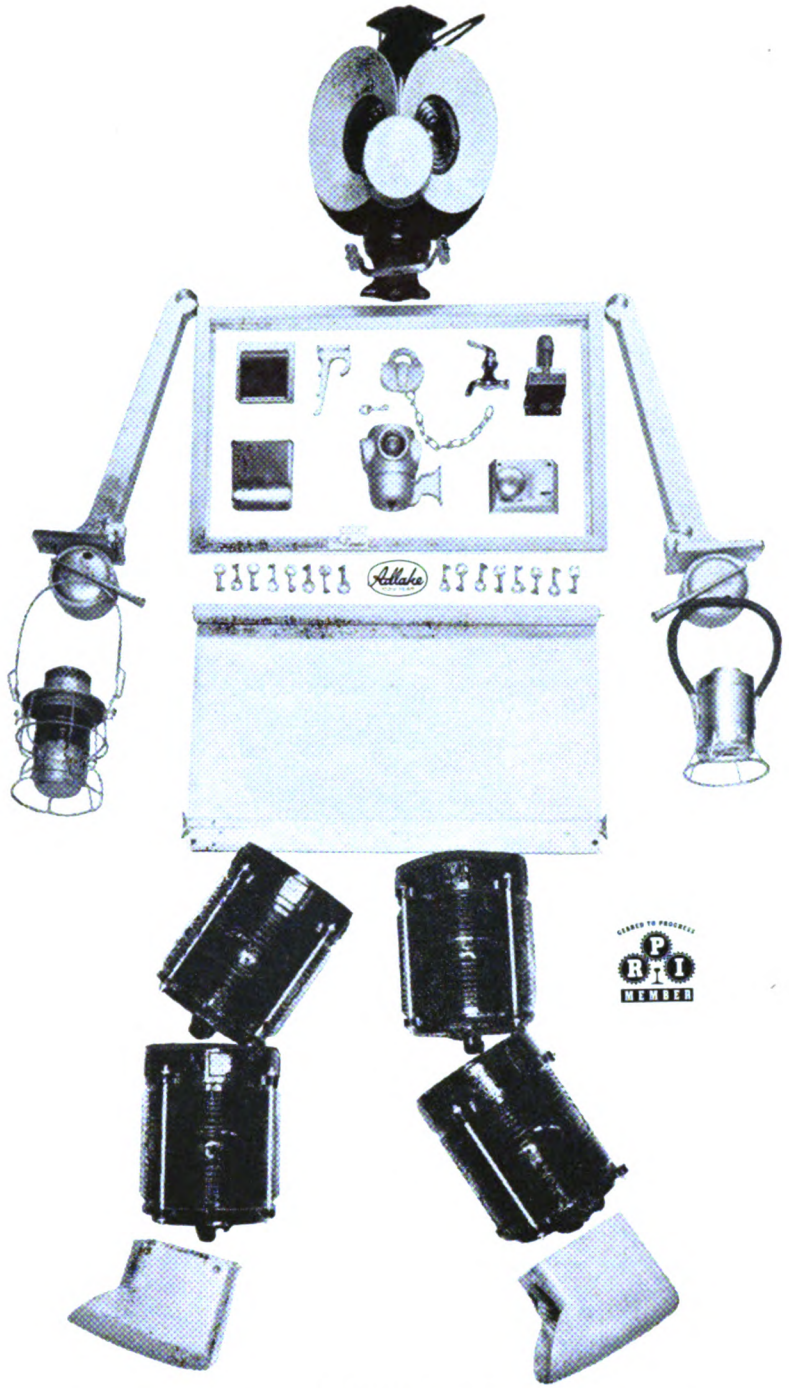
es the back cover assembly. The all parts involved in this assembly ve been delivered to this station by small-parts conveyor system after y have been cleaned. In addition to plying the complete back cover with multiple spindle torque adjusted ol, this mechanic also gages the vers, straightens them when neces-y, replaces the choke, and assem-s the unit prior to its application to body.

The assembled portion is now oved to one of the seven test racks. ne rack operator goes through the escribed test sequences. Some de-cts can be corrected without remov-g the portion from the test rack. hen results indicate that this will not sufficient, a collar on the conveyor rrier is moved to a position which dicates that this is a defective por-on. A small colored magnet is ap-ied to the body of the portion to in-cate the nature of its defect. The nveyor system then operates to nsfer this portion to a rework bench. ere two machinists correct the de-cts in the conventional manner, dis-sembling the portion to make neces-ry repairs.

Portions which have successfully assed the rack test continue on the nveyor to the shipping position. At is point, a multiple spindle wrench used to apply the shipping cover, nd the portion is properly stencilled nd then transferred to one of the con-ainers used for transportation to line oints.

In addition to applying shipping overs, the machinist helper at this ench also operates an automatic trainer cleaning device. Strainers re-moved from the pipe brackets of cars come to the shop in the service-por-ion shipping cover. The automatic strainer-cleaning machine has a maga-zine holding a dozen strainers. A pho-toelectric cell on this magazine initi-ates the cleaning cycle. The cleaning device, itself, is a standard conven-tional unit.

Mechanization of many of the op-erations and control of conveyors ne-cessitated the development of many specialized control devices. Each of the two production lines has seven electronic control units, nine photo-electric cells, and a large number of limit switches and time-delay relays.



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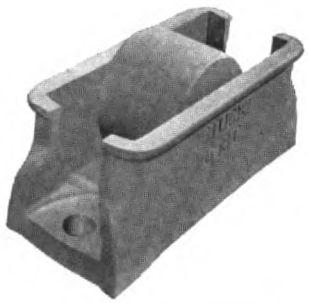
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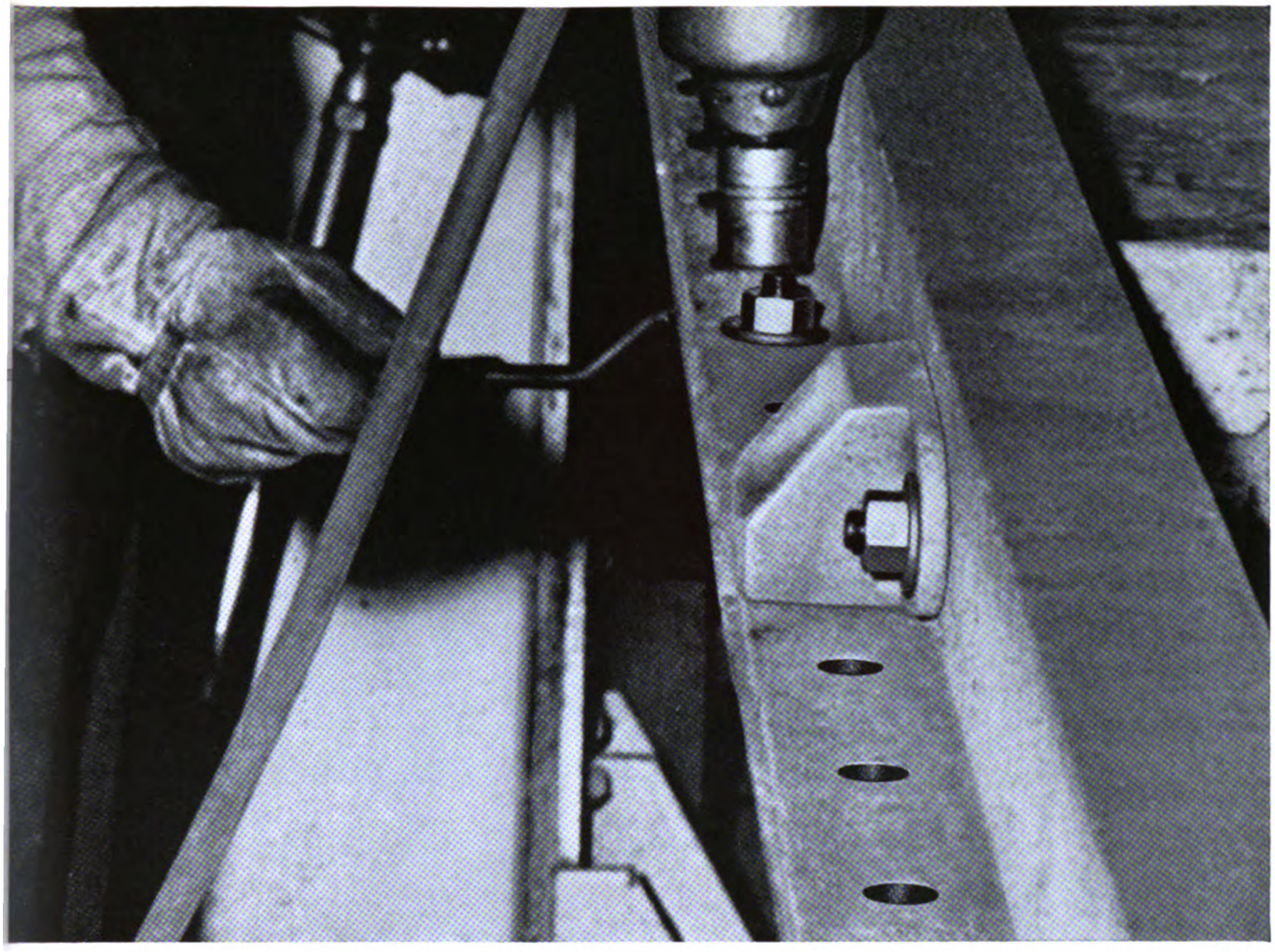
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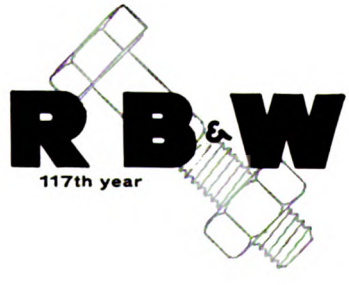


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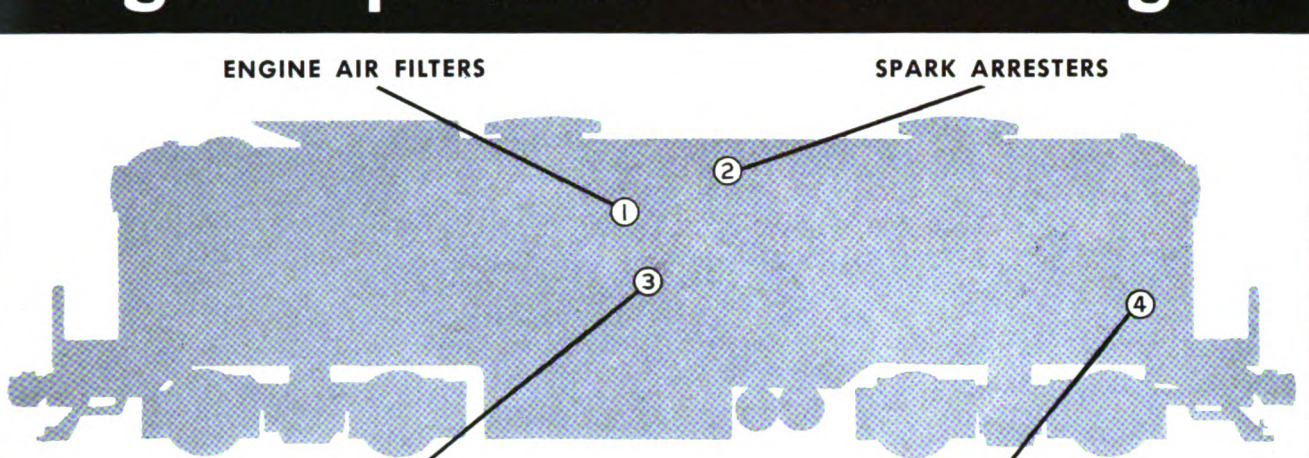
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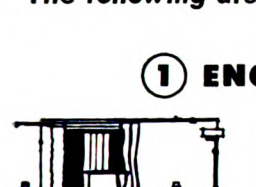
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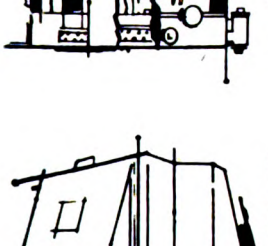
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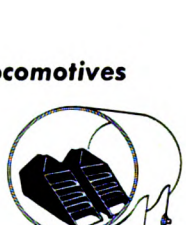


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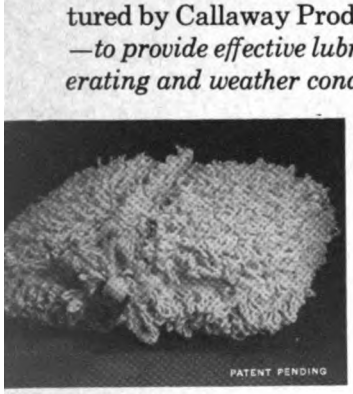
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REPORT FOR OCTOBER

Importance of Wedges Stressed by AAR

Supervisors and carmen removing and inspecting journal-bearing wedges do not always understand the functions which a wedge is to perform, two AAR Mechanical Division task forces reported recently following field investigations of wedges. Because some believe the wedge is only a filler block which facilitates application and removal of the bearing, the AAR wants all concerned with truck maintenance to know that wedges must have properly lubricated smooth top and bottom surfaces to provide for their free lateral movement. Without this free lateral, the journal bearing can become tightly wedged against either the collar end or the fillet end of the journal, causing undue end wear and overheating.

"Journal bearing wedges should receive proper care in handling, transit, and storage in a suitable manner similar to that outlined in the Lubrication Manual for journal bearings. Storage should preferably be indoors to prevent accelerated corrosion. Forged wedges become easily nicked when thrown or dropped in handling," the report stated.

Summaries of 479 wedges inspected by the AAR group showed 104—21.7%—condemnable. Their defects were:

Flat on top, lengthwise	92
Distorted	10
Over-all length	2

It was also found that many points did not have wedges in stock, while others did not have the supplies required by Interchange Rule 66. Practically all of the condemnable journal bearing wedges must be renewed in connection either with the repacking of cars or in connection with wheel changes. Proper repair-track stocks are important.

The Sub-Committee also looked into some of the wedge reclamation practices. It was their conclusion that results obtained by forging depressions into the top of the wedge to compensate for worn metal require investigation. One road found forging of depressions into the tops of wedges results in increased upward deflection at the ends, causing wedges to lose proper contact with journal bearing.

Bituminous Coal Research Center Relocating

The Columbus, Ohio, and Pittsburgh, Pa., activities of Bituminous Coal Research, Inc., are being consolidated in the industry's new coal research center at 350 Hochberg Road, Monroeville, Pa.

Mechanical Division Appoints New Committee Chairmen

Reorganization of the AAR Mechanical Division Committees, in accordance with the resolution adopted at the San Francisco meeting last year, has resulted in the appointment of the following new committee chairmen whose terms are now limited to a period of three years: *Sub-Arbitration Committee*—C. W. Kimball, chief of car inspection, Southern; *Prices for Labor and Materials*—L. H. Schierbecker, general superintendent car department, Illinois Central; *Brakes and Brake Equipment*—R. J. Dewsbury, general air brake inspector, Chesapeake & Ohio; *Loading Rules*—N. A. Williams, engineer—car maintenance, Union Pacific; *Locomotives and Locomotive Fuels and Lubricants*—P. J. Finch, assistant superintendent motive power — diesels, Chesapeake & Ohio; *Wheels and Axles*—T. R. Fredriks, manager—applied research, New York Central; *Lubrication of Cars and Locomotives*—M. A. Pinney, engineer of tests, Pennsylvania; *Journal Roller Bearings*—H. J. Stein—assistant chief mechanical officer—engineering, Atlantic Coast Line.

Other chairmen who will continue in office until the expiration of a three-year

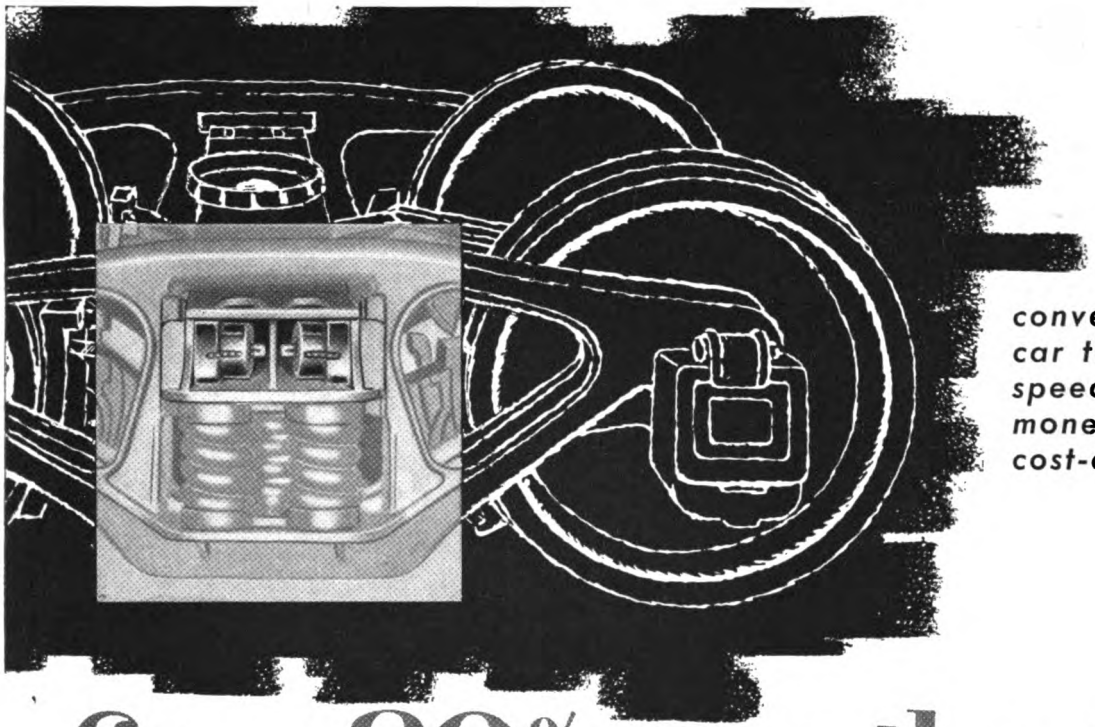
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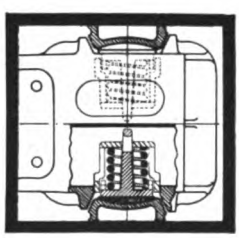
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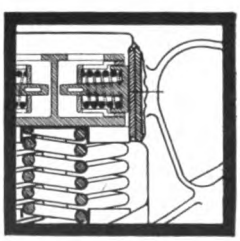
Write or call for the new Tell-All Bulletin RS-2.

NEW

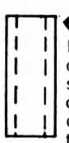


New Large control spring for full face pressure, longer life.

NEW



New Center Retention Means for simplified assembling and dismantling.



RS-2 Spring cushioned pressures do not disturb load distribution on the journal.



Wedge made pressures disturb load distribution on the journal.

Holland Volute Snubber Springs



Either 2½" or 1⅜" Spring Travel.



STYLE E-2 Volute Snubber Spring, 2½" Travel in 50 Ton Group.

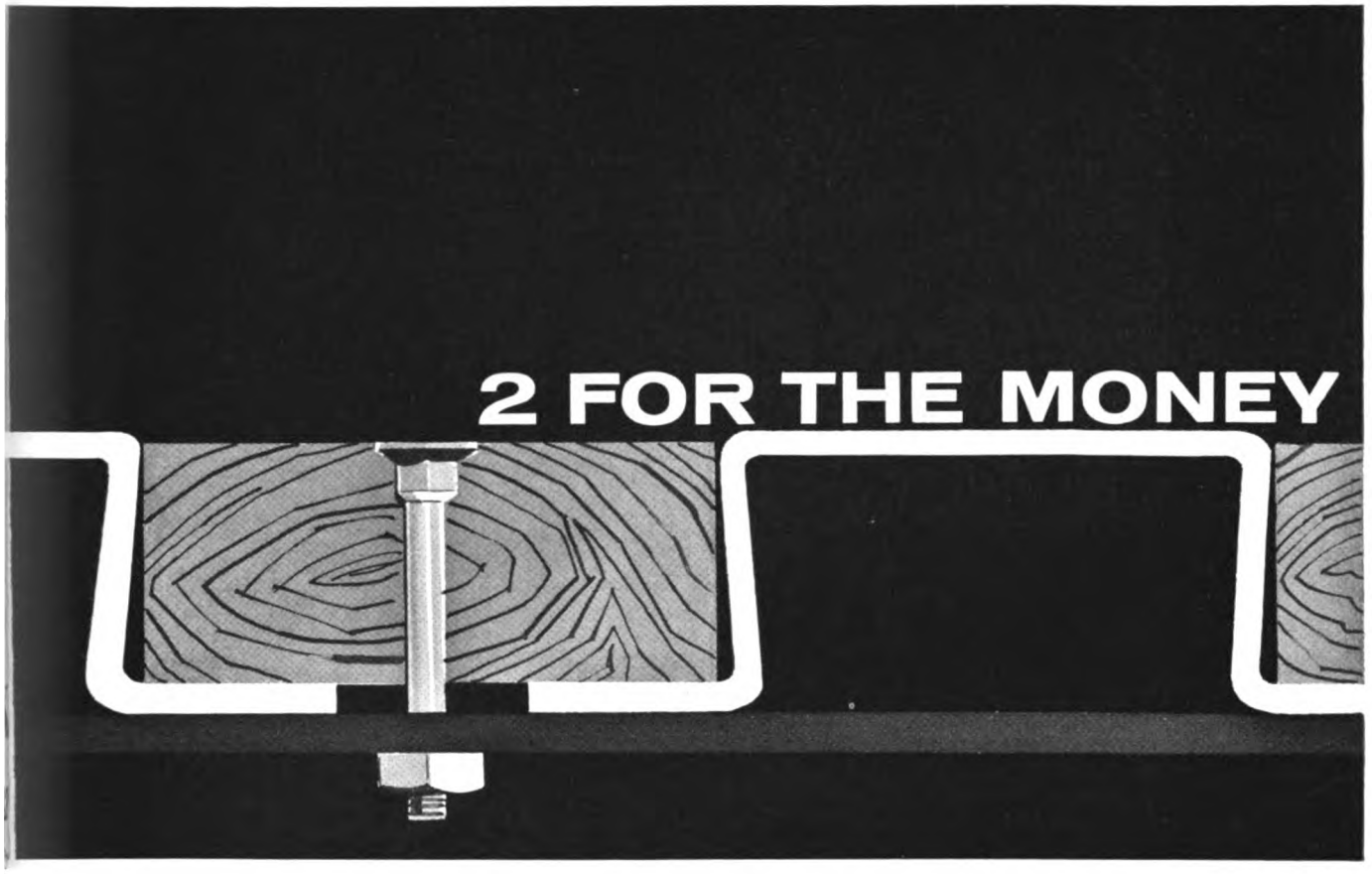
Upgrades ride by introducing an unusually smooth snubbing action with an exceptionally high load carrying capacity. Holland's principle of utilizing the sliding action of telescoping radially compressed coils with ample friction area eliminates the "bombarding" problem. 518R

HOLLAND COMPANY

332 S. MICHIGAN AVE. • CHICAGO 4, ILLINOIS

for the finest in freight car truck controls!

New steels are born at Armco



Lay Armco Car Floors For BULK OR UNIT LADING

Give gondola, box or flat cars *multi-purpose* foundations with Armco Freight Car Flooring. Then there's no need to choose cars by floor type. Wood *plus* steel are the reasons.

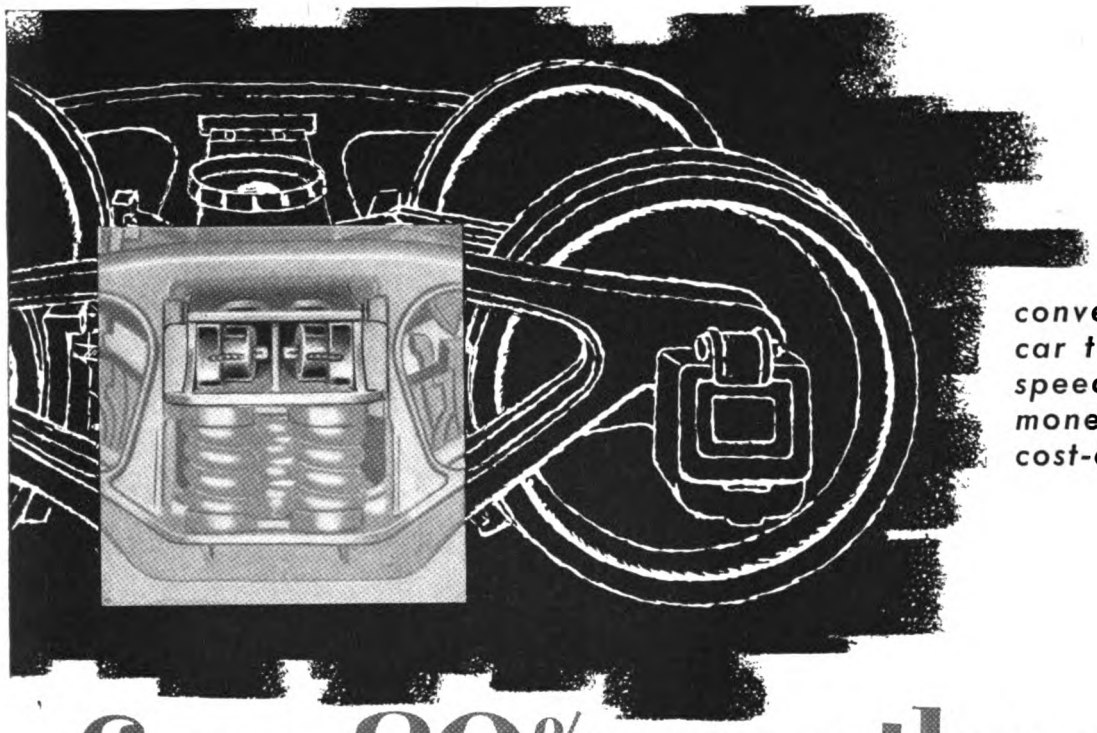
Stout wood planks in Armco Flooring are *nailable*. Skids and braces are easily secured. Alternating steel hat sections deliver top beam strength and rugged floor surface. Both reinforce car frames, securely anchor your lading.

Steel

For strength, durability and economy

You can floor and refloor on a *production basis*, too. Armco Engineers supply detailed drawings after study of your car frames. Floors arrive coped to clear rivet heads or with special steel planks where nailing strips are impractical. Get complete information. Call your nearest Armco Sales Office or write **Armco Division, Armco Steel Corporation, 2401 Curtis Street, Middletown, Ohio.**

ARMCO **Armco Division**



convert old freight car trucks to high speed service this money-saving, cost-cutting way!

Save 80% over the cost of new Freight Car Trucks

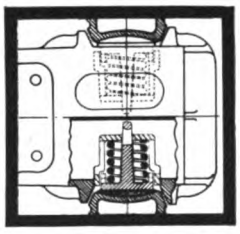
with the NEW HOLLAND RIDE STABILIZER RS-2

There's no need to let those serviceable old Freight Car Trucks be limited to slow speed service when you can convert them to profitable operation at a fraction of the cost of new trucks...The Holland Ride Stabilizer RS-2 has proven to give the same high-speed, lading-protecting, easy-riding characteristics you get in new, costly freight trucks.

You can convert any bolster of A. A. R. approved design and stabilize the ride laterally, vertically and longitudinally...The direct spring loaded control system of the Holland RS-2 **does not** cause uneven wear of the Journal Bearing when abnormal forces are exerted. Wedge made pressures just **do not** occur. Installation of the RS-2 components is unusually simple...And Holland Engineers will give you on-the-job assistance.

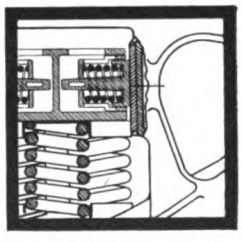
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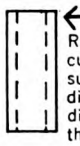


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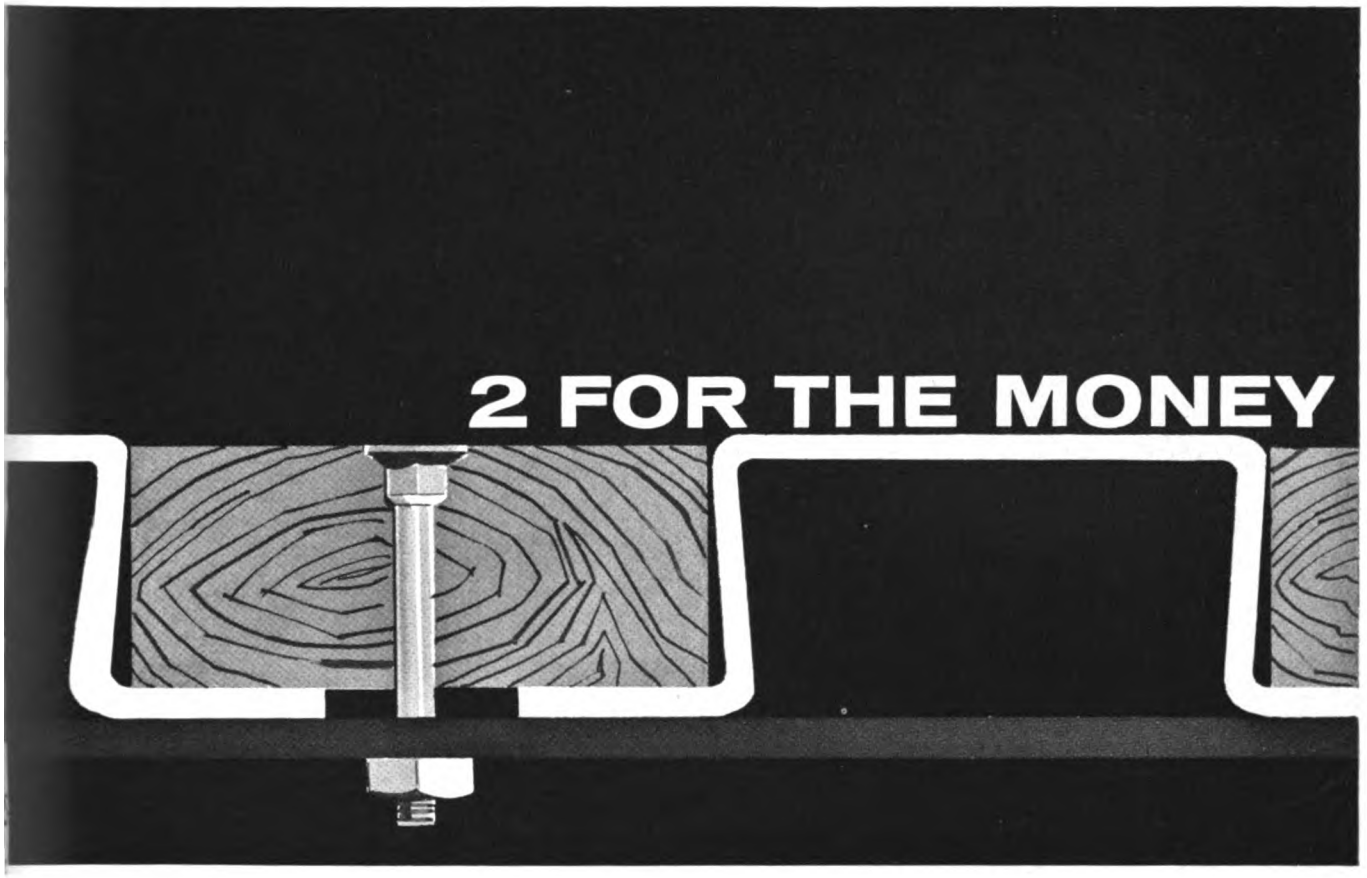
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ARMCO **Armco Division**

(Continued from page 5)

term are: *General Committee*—J. W. Hawthorne, chief mechanical officer, Atlantic Coast Line; *Arbitration*—H. M. Wood, assistant chief mechanical officer (car), Pennsylvania; *Sub-Price*—L. L. Pierce, supervisor, AAR Department, General American Transportation Corp; *Freight and Passenger Car Construction*—N. A. Passur, engineer car design and construction, Southern Pacific; *Couplers and Draft Gears*—V. L. Green, assistant mechanical engineer—car, Milwaukee; *Safety Appliances* — C. E. Pond, general superintendent motive power, Norfolk & Western; *Specifications for Materials*—R. McBrian, director of research, Denver & Rio Grande Western; *Tank Cars*—M. R. Buck, mechanical assistant, Santa Fe; *Electrical Equipment — Rolling Stock*—J. W. Horine, electrical engineer, Pennsylvania.

Removal of Waste Packing Speeded by AAR

A newly effective, shorter repack period for cars presently equipped with loose journal-box packing and Plypak containers will speed the installation of approved lubricators. The AAR Mechanical Division, effective October 1, has revised Section (a) of Rule 66 to step up the elimination of loose waste. The revised portion reads:

"(a)Journal boxes on empty cars, not repacked within time limits prescribed below, as indicated by stenciling on car, regardless of the responsibility of handling company for change of wheels or other repairs, must be repacked. If empty or loaded car is on repair track for other work and packing date is one month less than time limits shown below, journal boxes must be repacked regardless of whether or not car requires other repairs.

	Months
1. Cars equipped with all waste packed boxes	14
2. Cars equipped with Plypak containers	14
3. Cars equipped with journal lubricating devices	24

Where cars under authorized test are stenciled for repack period beyond periods shown above, the time period stenciled on car will govern. This work shall be done only where facilities are available."

Orders and Inquiries for New Equipment

Placed Since Closing of September Issue

Diesel-Electric Locomotive Orders

MISSOURI PACIFIC. *Electro-Motive*: 50 GP-18 diesel locomotives. Cost $9,000,000. Trading in 75 1,500-hp FT's on new units as a part of locomotive replacement program. Delivery of GP-18's to start in January.

Freight-Car Orders

ARMOUR & CO.—*General American*: 120 10,000-gal aluminum tank cars. To be insulated with 4 in. of fiberglass and used to carry liquid nitrogen fertilizer. Cost, approximately $20,000 each. For lease to Armour, together with 40 rubber-lined and 30 pressurized tank cars designed to carry anhydrous ammonia and phosphatic fertilizer solutions.

CHICAGO GREAT WESTERN. *General American*: 10 70-ton Dry-Flo covered hoppers; 5 70-ton flat cars.

FLORIDA EAST COAST. *Pullman-Standard*: 22 Lo-Dek flat cars for handling automobiles. Cost, $278,000. Delivered.

MILWAUKEE. *North American Car*: 25 Mark III Flexi-Van flats. On lease. Cars, now delivered, supplied by Strick Trailers Div., Fruehauf Trailer Co.

NEW YORK CENTRAL. *Greenville Steel Car*: 50 50-ton twin Flexi-Van Mark III flat cars. For delivery this month. Cost, slightly more than $12,000 per car.

NORTHERN PACIFIC. *General American*: 20 70-ton, 2,600-cu ft Airslide covered hoppers. Estimated cost, $300,000. In addition to 20 previously ordered (RL&C, Aug. 1961, p 6).

SOUTHERN. *Magor Car*: 200 aluminum-covered hopper cars. Volume capacity, 5,000 cu ft; weight-carrying capacity, 100 tons. Cost, $4,800,000. Deliveries to begin in November.

TRANSPORT LEASING CO. *Pullman-Standard*: 6 Chem-O-Vac covered hoppers—3,500 cu ft capacity. Equipped with stainless-steel center discharge outlets for pneumatic unloading of bulk chemicals. For lease to Union Carbide Corp.

UNION TANK CAR. *Company shops*: 75 tank cars. Delivered.

WESTERN MARYLAND. *Pullman-Standard*: 25 50-ton box cars; 14 70-ton, 89-ft 1-in. Auto Rack flat cars. For October-November delivery.

WESTERN PACIFIC. *Thrall Car*: 40 70-ton box cars; *General American*: 3 70-ton covered hoppers. *American Car & Fdry.*: 10 100-ton, 4,000-cu ft capacity aluminum Center Flow covered hoppers. For delivery this month.

ZONOLITE CO. *Union Tank*: 2 4,000-cu ft capacity underframeless, aluminum covered tank hopper cars. On lease.

Notes and Inquiries

Pullman-Standard anticipates a $1,000,000,000 market in rapid transit cars during next 10 years. Prediction based on increasing traffic snarls in America's fast-growing cities.

Soo Line Board of directors have authorized expenditure of $1,300,000 for purchase of 40 50-ton box cars equipped with special loading devices; 6 special-design cars for tin-plate loading; 2 4,000-cu ft capacity covered hoppers; 20 52½-ft gondolas for loading steel billets; 15 85-ft TOFC flats. Will also lease 25 45-ft TOFC flats. All cars to be equipped with roller bearings and delivered by end of year.

Personal Mention

Chesapeake & Ohio.—*Grand Rapids, Mich.:* C. A. THOMAS appointed district car foreman, succeeding MARTIN VAN GELDERN, retired.

Ferrocarril de Chihuahua al Pacifico. — *Chihuahua, Mexico:* VELAZQUEX LOPEZ, Ing. Rafael A. Santillan Medina, appointed general master mechanic.

Erie-Lackawanna.—*Meadville, Pa.:* JAY D. RENTZ appointed shop superintendent, program car shop, succeeding ARTHUR M. KROGER, deceased.

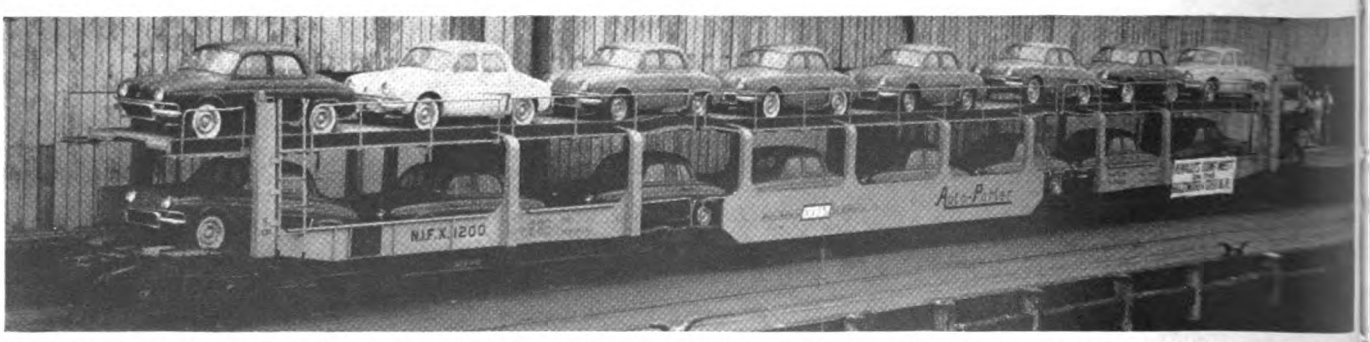
Louisville & Nashville.—*Louisville, Ky.:* FRED J. FLASPOEHLER appointed assistant superintendent of motive power. Mr. Flaspoehler formerly general foreman at Corbin, Ky. *Howell, Ind.:* E. N. BASKETTE appointed master mechanic, succeeding J. W. OAKLEY, retired. Mr. Baskette formerly general foreman at Radnor, Tenn.

Milwaukee.—*Milwaukee, Wis.:* F. A. UPTON, superintendent motive power, appointed general superintendent motive power. G. L. WOODS, superintendent car department, appointed general superintendent car department.

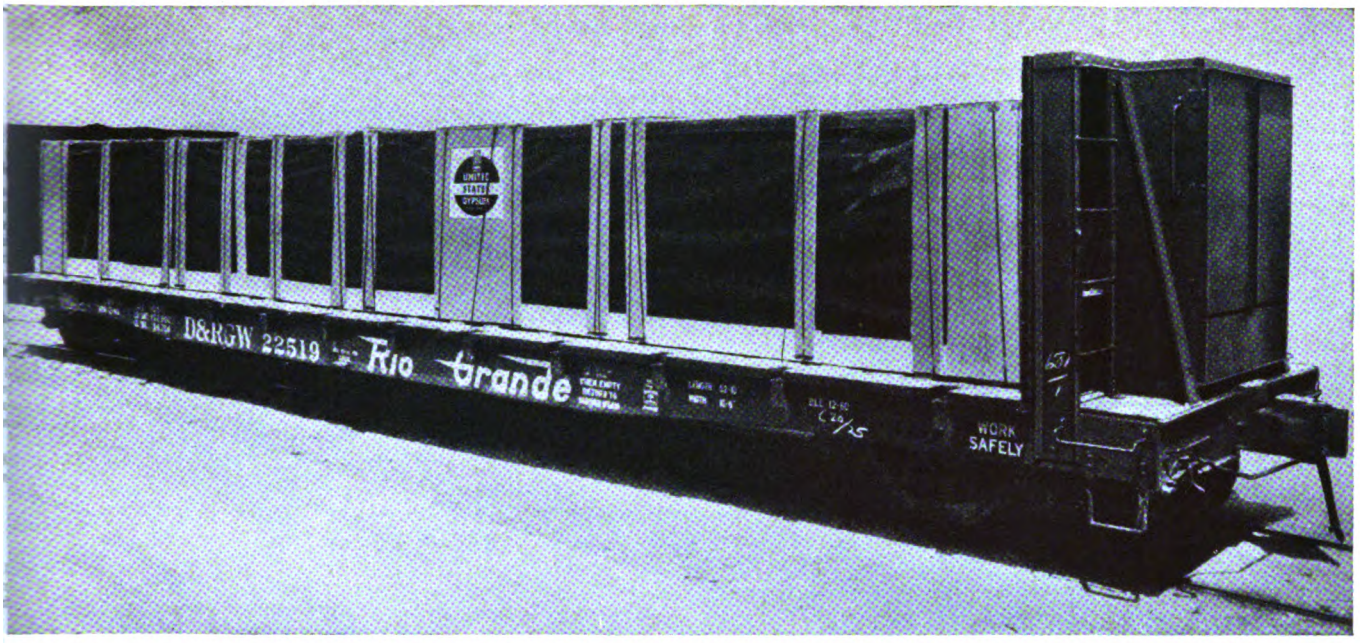
Norfolk & Western. — *Bluefield, W. Va.:* SYLVESTER C. MCKINNEY, JR., appointed assistant enginehouse foreman, succeeding J. R. WITT, retired. GARLAND G. BREWER, shop inspector, appointed mechanical inspector.

OBITUARY

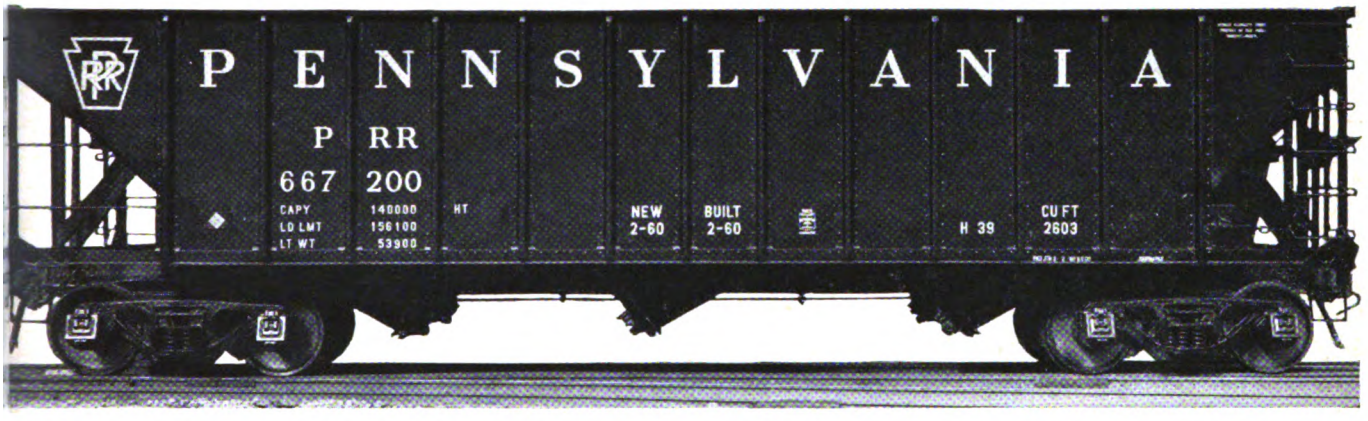
Leo B. George, 65, retired chief of motive power and rolling stock, Canadian Pacific, died Sept. 5.



The Auto-Porter, a German-built, three-unit, articulated car with two-wheel trucks, which can carry 16 compact type autos, or 12 standard size models, has been undergoing tests on the Baltimore & Ohio. Spring cushioning, roller bearings, and a special hydraulic draft gear reduce the effects of impact on the car, the height of which, from track to deck, is 2 ft 4 in.—13 in. less than the standard flat car. The Auto-Porter, built by Graaff-Elze in West Germany, is being shown in this country by North American Car Corporation and B&W Enterprises. In Europe, 1,500 are said to be in regular service. Initial estimates of the cost of loading have been set at less than $1 per auto.



SPECIAL-PURPOSE...



OR STANDARDIZED DESIGN...

both are Bethlehem-built

Steel

. . . for Strength
. . . Economy
. . . Versatility

The bulkhead flat at the top was designed and built by Bethlehem specifically for the transport of gypsum board—a tricky lading if there ever was one. Says one traffic executive: "Best job-engineered car we've seen up to now."

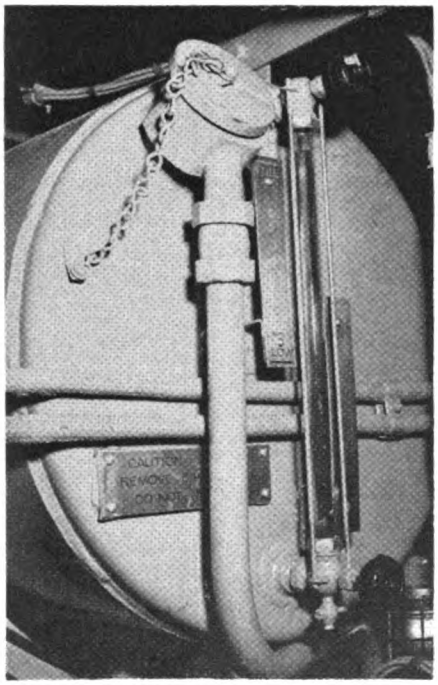
The 70-ton hopper, also built by Bethlehem, combines the advantages of standardization with modern production techniques, and has an anticipated service life of at least 18 years. Bethlehem cooperated closely with the committee of engineers which designed it, and has built it in quantity for the Pennsylvania and two other large coal carriers.

Bethlehem's car shops are manned and tooled to fit right in with the railroads' pressing need for more efficient rolling stock and lower operating ratios. We'll be glad to hear from you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



Diesel Cooling System

A pressurized cooling system which insures cooling water flow under high temperature conditions due to tunnel operations, radiator clogging, shutters partially closed, etc., is currently a basic application on GP and SD locomotives. A pressure relief cap permits the cooling system pressure to build up to approximately 3 psi as the water is heated to operating temperature. By pressurizing the system which raises the boiling point of the water 8 to 12 deg F at the water pump inlet, positive water flow is assured at the higher operating temperatures. With this closed system, evaporation losses are reduced. Refilling and adding of water treatment is practically eliminated. *Electro-Motive Div., General Motors Corp., Dept. RLC, La Grange, Ill.*

Trailer Hitch Wrench

The CP-3450-RPB air-driven wrench, according to the manufacturer, won't burn out as the result of a stall. It is applicable for use with all ACF trailer hitches and is said to operate most piggyback trailer hitches two to four times as fast as previous methods. ACF field tests have shown that the tool, operating at 300 rpm, elevates the hitch and locks it to the trailer kingpin in 32 sec, compared with 124 sec using other power wrenches for TOFC tie-down. Unlocking and lowering process requires 25 sec as against 92 sec previously needed. The wrench weighs 40 lb. Its throttle is a lever-type, rather than a roll type. *Chicago Pneumatic Tool Co., Dept. RLC, 6 East 44th st., New York 17.*

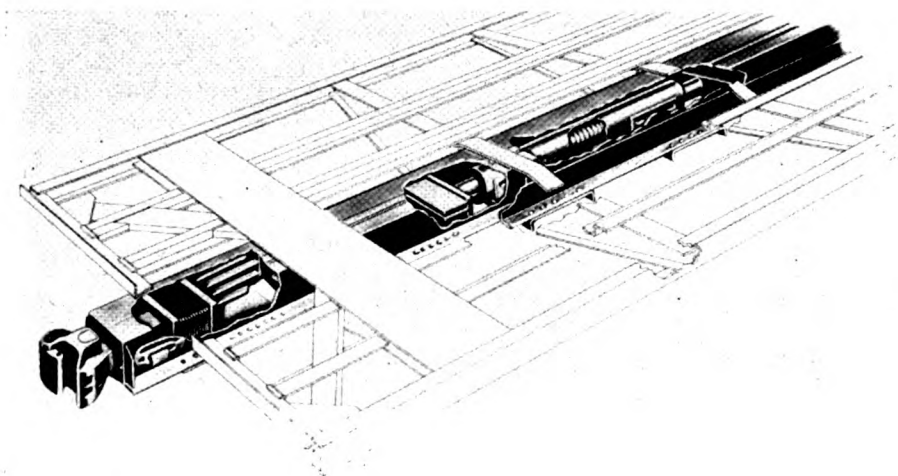


Lettering Kit

The "Let-R-Set" kit, which utilizes pre-cut pressure sensitive plastic film letters and numbers, is now available in 1-, 2-, 3- and 4-in. size characters and in white, black, yellow, blue, red, gold, aluminum, chrome, fluorescent red orange, and fluorescent yellow orange colors. *Demp-Nock Co., Dept. RLC, Warren, Mich.*

Nylon Castings

A nylon casting process makes available nylon shapes for side bearings, brake system bushings, dies, and similar parts requiring wear resistance and impact strength. The MC nylon material is a Type 6 nylon formulation which can be cast at atmospheric pressure in large sizes and without expensive molds. It is said to have good friction characteristics, light weight, corrosion resistance, and electrical and thermal properties comparable with those of similar plastics. The MC nylon is also available in stock shapes such as tubes and plates. *Polymer Corp., Dept. RLC, 2120 Fairmont ave., Reading, Pa.*



Super-Cushioned Underframe

A sliding sill provides frictional resistance to supplement cushioning elements in the Waugh Super-Cushioned underframe. Cushioning is effected by means of ring springs in a sealed, grease packed tubular steel housing, and a series of rubber Waughmats working between steel plates to cushion first shock of impact. At a 350,000-lb coupler force, the Type 150-8 underframe, through the combined resistance of the Waughmats, the friction of the sliding sill, and the ring springs, develops a total capacity of 150,000 ft-lb, providing more than six times the protection obtained from a friction gear. At the same coupler force, Type 170-10, which has a greater number of ring springs and longer travel, develops a capacity of 170,000 ft-lb. In the Type 150-10-S, a special development, a snubber is substituted for one group of ring springs so that the car is equipped with the ring-spring unit at one end and with the Waugh snubber at the opposite end. This type develops a capacity of 150,000 ft-lb. Recoil is practically eliminated and coupler force reduced to 26,000 ft-lb. *Waugh Equipment Company, Dept. RLC, 420 Lexington avenue, New York 17.*

Automated Flame Cutter

A computer controlled flame-cutting machine has been developed by Air Reduction in cooperation with General Electric. The Tapeograph is an automatic rectilinear bridge type unit capable of cutting straight lines and contours in plate of any length, 22 ft in width and up to 6 in. thick. No templates or template tables are needed. The cutting system consists of two main components—the director, a GE Mark Century numerical contour control system, and the cutting machine proper. Predetermined, numerically coded instructions automatically control flame-cutting operations. Under the Airco system, the part to be cut is designed and engineering drawings prepared. Dimensional information extracted from

(Continued on page 44)



The built-in hypocycloid gear is the power secret! Free to follow the eccentric crankshaft, but not free to rotate itself, it produces a 6:1 reduction ratio.

Pending

NEW! Wine Power Geared* Discharge Gate

N UNDER A 70-TON LOAD one man can open this gate. Accurately machined mating surfaces provide free operation and a tighter seal. No more sledging r damage in attempts to open "frozen" hopper doors. ric steel castings eliminate distortion.

CISION-MESHED GEARS without costly machining! cingly accurate shell molding process helps keep unit etitively priced despite *Power-Gear* features. Rack-and- ı principle assures parallel operation without side bind- ıll bearing surfaces are lubricated with Moly Disulfide.

COMPLETELY PREASSEMBLED for easy installation, ready for welding. No further fitting, no extra parts required during assembly of car. 13x24" opening fits most standard chutes. Interchangeable with most present gates; equipped with standard boot groove. Conforms to all recognized unloading devices. Now in service on six major railroads and a car leasing company. •

A TRIAL APPLICATION WILL CONVINCE YOU! Complete specifications and application data on request.

WINE
Railway Appliances

WINE Railway Appliances by UNITCAST CORPORATION • TOLEDO 9, OHIO

EDITORIALS

Those Excellent Exhibits

We do not have an exact count on the attendance at the September mechanical meetings at Chicago but the registration was near the 4,000 mark. No matter what the attendance was we believe it should have been much larger because the exhibits were outstanding.

The inside exhibits at the Hotel Sherman were truly wonderful. The track exhibit, however, stole the show. Every man that saw the cars and equipment displayed on about a mile of track was impressed by the fact that every car and every piece of equipment was designed and built for a specific job. They were evidence that more research and development of railroad equipment have been done in the past few years than in any time in the history of the railroads.

The exhibits offered a fine opportunity to see the tools the railroads must have to retain and recapture traffic. We are sorry if you missed the show. They were worth the time and expense of the trip to Chicago.

More Than Lading Protection

Application of hydraulically cushioned underframes to piggyback cars, to tank cars for hauling liquid hydrogen, and to full-door box cars may mark the beginning of a new trend in car construction. Previously, high-capacity, hydraulically cushioned underframes were applied to conventional box and flat cars where they could give maximum protection to fragile ladings. While long-travel underframes do protect the loads on all cars to which they are applied, their use can also make possible new car designs and new construction techniques. When car structures are no longer required to absorb the high-energy longitudinal impacts which yard and train operation develop, structures can then be simplified and lightened. Completely new arrangements are possible.

Pullman-Standard recently stated that its Hydroframe-60 underframe made possible the Full-Door box car (RL&C, September 1961, p 65). "Heretofore," P-S reported, "a car on which the entire side opened up would not have been feasible because of the severe wracking and distortion of the body structure that would result from coupling impact forces."

General American and Linde recently cooperated in the production of liquid hydrogen tank cars which move their super-cold ladings at 423 deg F Below zero. Each car is basically a "thermos bottle" arrangement having a highly insulated inner tank within an outer shell. "Because structural supports between the inner and outer shells represent paths for heat flow, it was necessary to make these supports as small as possible," General American reported. "To reduce the size of the members and yet resist the longitudinal impacts developed in train operation, the Hydra-Cushion underframe was utilized."

When used on piggyback cars, the high-capacity underframe arrangements can simplify tie-down arrangement and may simplify the transportation of trailers, containers and racks on a car of a single basic design.

Car designers already are taking advantage of hydraul cushioning to produce new types of cars. It is probabl that much more will be done. It should also be possibl to redesign existing types of cars with substantially le material, or with completely new materials.

Production in Maintenance

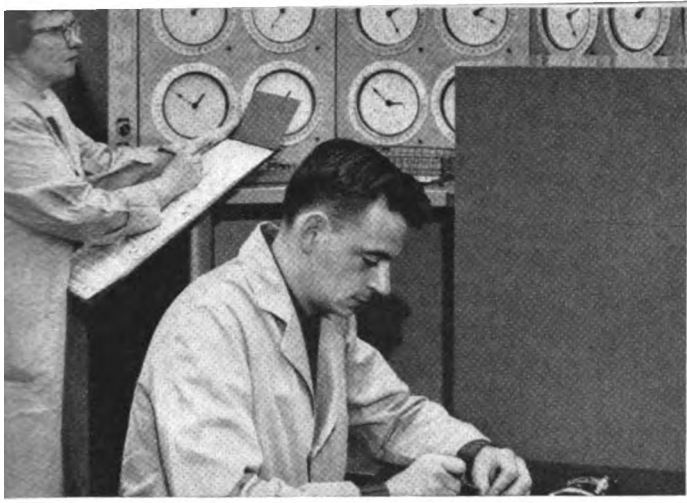
The railroads have made great progress in utilizing th steel wheel on the steel rail to produce efficient transporta tion yet they have been relatively slow in applying produc tion principles to shop and terminal maintenance worl They appear to be backward in this respect because a American industries have been characterized by an excep tional talent—the ability to plan and set up productio lines. And our railroads are an outstanding example of production line with a ton-mile output per man hou greater than any other form of land transportation.

Whatever the reasons for the lateness in applying pro duction principles to maintenance work, the current crit cal economic condition of the railroads has accelerated th adoption of repair and shop layouts and the installation tools and equipment that reduce maintenance costs. C spot repair systems have been installed in volume on during the past few years although the Norfolk & Weste had put in such a facility about 15 years ago at Bluefiel W. Va., based on the production line principle of movi the work to the men, tools and materials.

The same principle is currently being applied to dies locomotive inspection and maintenance work and adop tion of this spot system is proceeding at a more rapid pac The first such system went into operation on the Souther Pacific at Ogden, Utah, early in 1959 (RL&C, Dec. 196 p 23) and already several railroads are equipped wit locomotive spot inspection and maintenance layouts.

Three basic types of spot system shops were ably pr sented by S. C. Snow, superintendent motive power, Loui ville & Nashville, and chairman of the Shop Equipme Committee, Locomotive Maintenance Officers' Associ tion, on September 11 during the association's annu meeting. The committee report, summarized elsewhere this issue, showed variations in layouts and procedures t meet different requirements of individual roads. Althoug the layouts differ they all have one thing in common—th produce maintenance work at less cost through the ad vantages inherent in moving the work to men, tools an materials.

Wherever repetitive maintenance and repair work ex ists the opportunities to reduce non-productive time b applications of the same principle are also present. Som railroads have done a fine job in this respect but ma more could profitably explore these possibilities for poten tial savings.



Spectrometer at Cleveland Research Center shows that wear in locomotives using Talona RS Oil 40 is negligible. Lab technician in foreground prepares samples.



Amazing performance record of Talona RS Oil 40 was set up in EMD diesel locomotives. Oil was used on heavy-duty freight operations.

LUBRICATION:

"After 316,000 miles of heavy-duty use, Shell's Talona RS Oil 40 still does not need draining," reports the New York Central

The New York Central Railroad system has just completed its latest monthly check on Talona RS Oil 40 – after the oil had been in use 316,000 miles.

The railroad's lubrication experts report that the oil is still in sound condition, and satisfactory for continued use.

Read how Talona® RS Oil 40 can help trim your operating costs.

LOCOMOTIVES that used to need an oil change every 50,000 miles now run 300,000 miles and more between drains. The reason: Shell Talona RS Oil 40.

New proof of this oil's outstanding performance has just been disclosed by one of the largest railroads in the United States.

Recently, when New York Central Railroad sent samples of Talona RS Oil 40 to the Cleveland Research Center for testing, the oil had been used on heavy-duty freight operations – for 316,000 miles.

Despite the high mileage, the railroad's lubrication experts could report these amazing results:

> *Insoluble contaminants are still being controlled by filters at safe levels. Spectographic analysis shows that wear is negligible. And there is no excessive thickening of the lubricant.*

The lubrication experts recommended that the oil should be kept in use. And the railroad has extended the drain period indefinitely.

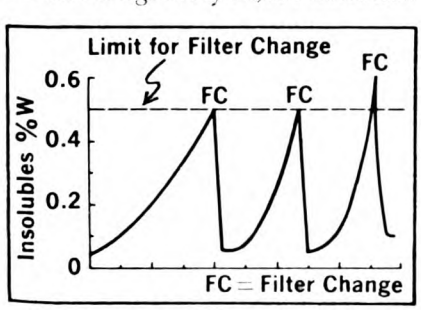
Here are 3 key features of Shell's Talona RS Oil 40 that can help you trim your railroad operating costs:

1. Talona RS Oil 40 has excellent filterability.

2. Talona RS Oil 40 contains special Shell additives that resist oil oxidation, even in heavy-duty work.

3. Talona RS Oil 40 contains alkaline additives that neutralize acids.

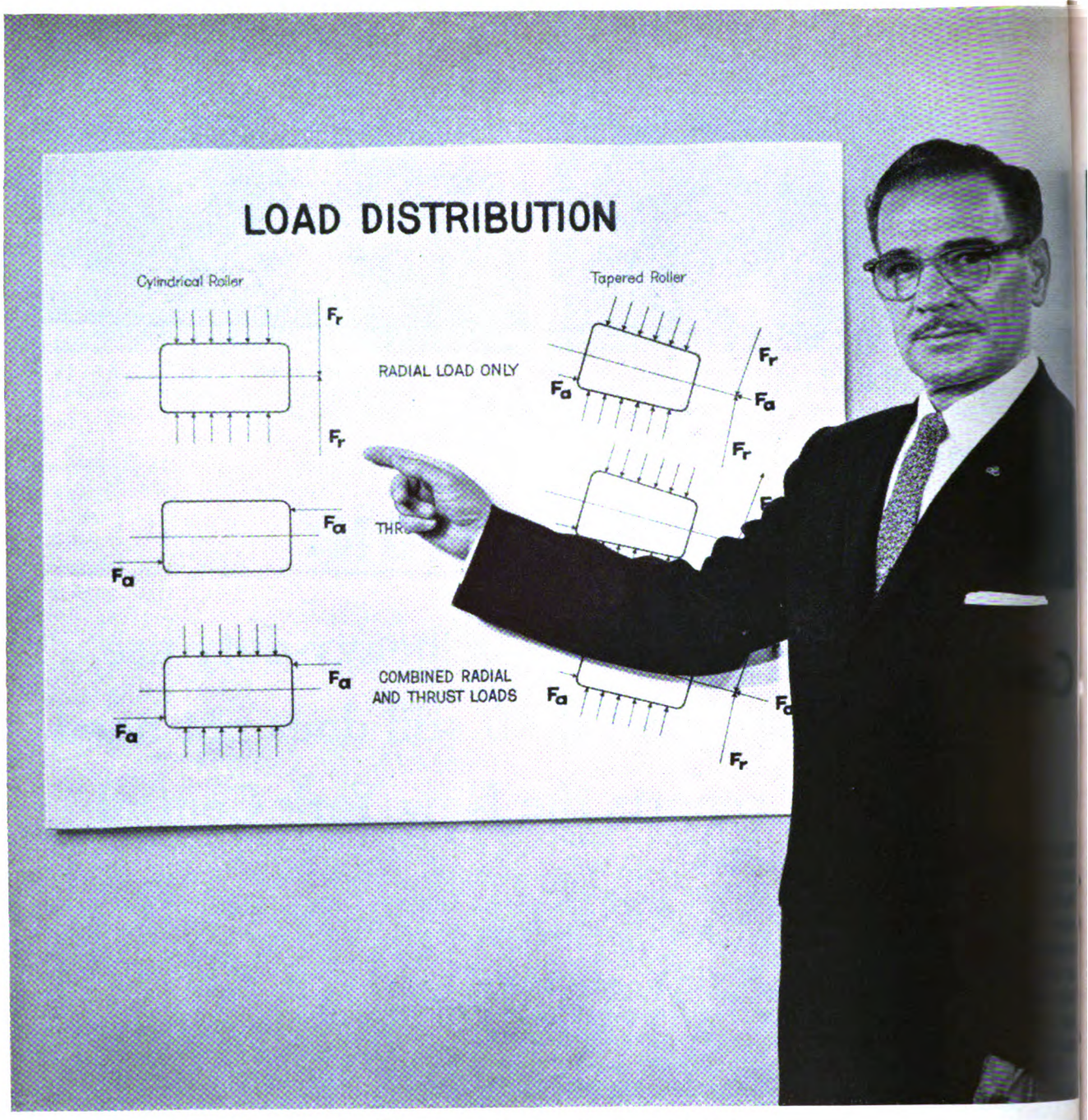
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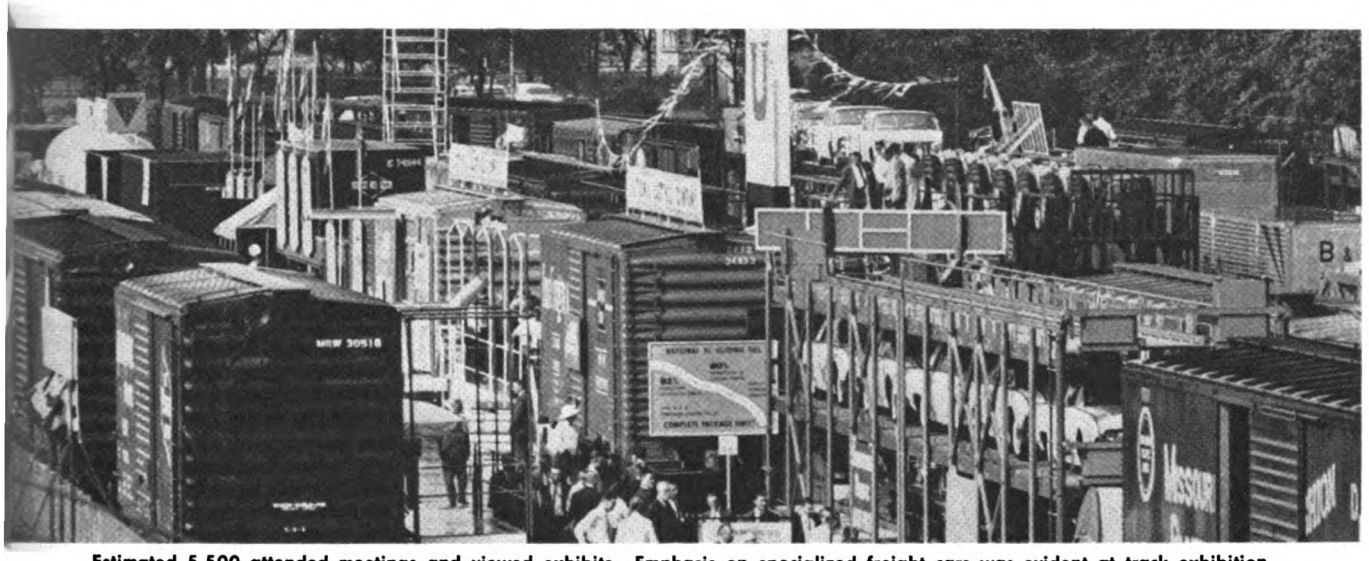
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Estimated 5,500 attended meetings and viewed exhibits. Emphasis on specialized freight cars was evident at track exhibition.

Coordinated Studies New Problems

Equipment and maintenance methods are changing; exhibit shows new developments coming rapidly

Marketing, public relations, and political activities must match the pace being set by railway equipment designers if the investment which railroads are making in new motive power and rolling stock is to pay off. This was stressed by several speakers at last month's Coordinated Mechanical meetings in Chicago.

Simultaneously, the exhibits of the Allied Railway Supply Association demonstrated how rapidly new car and locomotive components and completely new types of cars are being developed. Approximately 80 pieces of equipment were shown by 40 exhibitors on almost a mile of track along Chicago's lake front, and 121 suppliers participated in the exhibition in the Hotel Sherman. Emphasis was on cars designed for specialized transportation assignments. "The $20 million of new equipment," according to the American Railway Car Institute, "was developed to enable railroads to capture a larger share of the freight business by replacing general-purpose cars with economical and efficient rolling stock designed for specific transport jobs."

"The extraordinary problems which railroads and suppliers face in the decade of the Sixties cannot be met by ordinary 'run-of-the-mill' methods," Reading President E. P. Gangewere told the annual luncheon of the Air Brake Association, Locomotive Maintenance Officers Association, Car Department Officers Association, and Railway Fuel and Operating Officers Association.

Calling for the simultaneous surmounting of what he termed "Six Steps for the Sixties," Mr. Gangewere predicted that "Transition through Technology," Step One, will continue at an accelerating pace. Along with increased locomotive efficiency, he foresaw progress in remote control of railroad operations, replacement of the box car by containers, increased standardization of rolling stock, and more effective management control. "We should recognize that the railroad is really nothing more than a continuous conveyor belt . . . which can compete successfully with the bulk-moving ability of water carriers, the speed and flexibility of highway carriers, and the specialized transportation of the pipeline," he said.

New concepts which will enable railroads to offer services and prices that will make it possible for them to compete for traffic were indicated as Step Two in Mr. Gangewere's plan. The remaining four steps: Improving the Service, Pricing for Profits, Selling with Spirit, and Winning Public Opinion.

"Acceptance of the fact that it is time for a complete cure of transportation policy defects is the one step that must be accomplished if the railroads, and transportation as a whole, are to survive this decade," Mr. Gangewere warned.

"Many of the problems which beset the railroad industry are basically legislative and political in character," C. M. Roddewig, president of the Association of Western Railways, told a CDOA meeting. "These difficulties are so severe as to almost preclude any real progress within the industry through new technology unless they are remedied.

"It has been a combination of equipment, price, and service that has



E. P. Gangewere, Reading



C. M. Roddewig, Assn. West. Rys.



E. P. Butler, ICC



S. D. Moseley, GATC



C. N. Wiggins, L&N

brought about the tremendous growth of piggyback business," Mr. Roddewig explained. "Development and use of new equipment sometimes run into financial difficulties, but not into regulatory problems of the type that are today strangling the American railroads. When railroads have attempted to bring into play the second ingredient in attraction of new business—pricing of service when handled in new types of equipment—they have run into serious governmental restrictions. We have real trouble passing on to the shipping public any of the transportation economies which are made possible by the equipment innovations. This is true not only in piggybacking and container service, but also with respect to the newly developed bulk and liquid-commodity cars as well."

Mr. Roddewig then described the legislative, regulatory, and public relations fight in which the railroads were involved by the Teamsters Union, motor carriers, and water carriers over Senate bill S1197 in the last session of Congress. Mr. Roddewig praised the efforts of railroaders who wrote to the Senators in unprecedented numbers expressing opposition to the bill which failed to come up for action in the recently concluded session.

"In this age of rapid advances in technology, railroad practices can become obsolete overnight," C. N. Wiggins, assistant general manager, Louisville & Nashville, told the LMOA. "Line production methods of repairing cars, locomotives, and their appurtenances are a necessity . . . New methods of handling our customers' goods, such as auto racks, piggyback, and cushion underframe cars, are providing a potential growth factor that can, and will, bring back to the rails business lost to competitors . . . We must not be satisfied with our operations until all waste both in manpower and material is eliminated."

Containers Coming

A prediction about the future of containerization was made for the CDOA by S. D. Moseley, president of General American Transportation Corp. Calling the container the "lowest common denominator of transportation," Mr. Moseley looked to 175,000 of these boxes in service ten years from now. "Value of the container goes beyond its concept as a vehicle," he said. "It will make possible a whole new concept of distribution.

"The vice-president of operations of a very important railroad recently said that within the next five to ten years he expected that 75% of the commodities now carried in box cars would be moved in containers. The chairman of another railroad questioned the wisdom of investing in new box cars because of the probability of their early obsolescence due to containerization.

"We are much closer to general standards in the container field than could have been hoped for 12 months ago."

Mr. Moseley then proposed that containers be supplied by shippers or by an equipment pool, citing the simplification of distribution, maintenance and accounting. It would also make it possible for railroad efforts and capital to be directed towards improving plant and rolling stock. Customers must have cars that can take both trailers and containers interchangeably and in mixing loads for the trailer will remain an important vehicle to the railroads.

"In my opinion," Mr. Moseley concluded, "The opportunity for the railroads has not been brighter in decades than at the moment."

Commenting on the improved hot-box record, F. Peronto, executive vice-chairman of the AAR Mechanical Division, said it is not due solely to lubricators. He said that over the past few years the Division's program has also involved lubricants, bearing design and metallurgy, journal finish, improved wedges, elimination of cast-iron wheels, and improved truck designs. Currently, 72% of the U.S. freight-car fleet is equipped with lubricating devices.

Vigilance should be exercised by the railroads so that all defects and conditions, or combinations of conditions, that indicate a defect may be developing, will be found at the time of inspection, E. R. Butler, assistant director of locomotive inspection, ICC, told the LMOA.

The 49th Annual Report of the Director of Locomotive Inspection to the ICC showed numerous accidents and casualties which "could have easily been avoided if proper visual inspection and repairs had been made. Of the 50 accidents reported during fiscal 1960, 15 were caused by defective floors, steps, passageways, and cab seats. Eight of these were caused by defective cab seats, while seven resulted from oil on walking surfaces. These defects, without a doubt, could have easily been detected at the time of the last 24-hr or calendar-day inspection. They could have been corrected before accidents occurred."

Reports of some of the committees are summarized on following pages

CDOA Seeks Changes in AAR Rules

limination of the step size requirements or axle turning, revision of the recently ompleted piggyback interchange rules, and xing as an originating road responsibility ll load adjustment and blocking necessary n cars en route were among the recom- endations made to the AAR Mechanical ivision by the Car Department Officers ssociation last month. Interchange Rules, pen-Top Loading Rules, Wheel and Axle anual and other Mechanical Division egulations could be involved if CDOA commendations are adopted.

The railroad on which a car is loaded ould be responsible for all adjustment d strengthening of load securements hich must be performed before car reaches s destination, the CDOA Committee on oading Rules urged. Citing Rule 1, Para- aph A of the General Rules of the AAR pen-Top Loading regulations and the reface to these rules, which require that rs in suitable condition must be loaded compliance with mandatory AAR re- irements before being accepted from ippers, it was felt that the entire responsi- lity for subsequent work is that of the iginating railroad.

"The placing of good-order cars for ship- rs is of prime importance in proper load- g," the Committee said. "When floors are cayed, broken, or missing, regardless of w well securements are installed, the lad- g will shift en route. Loads will be delayed d there will be unnecessary expense to ndling lines." C. W. Kimball, chief car spector, Southern, urged that roads check rs for broken bolsters and center sills be- re they are placed for loading. This, he id, should also be an originating road re- onsibility.

The Loading Rules Committee reported at railroads frequently ship wrecked ight cars loaded unsafely in gondolas or flat cars. During discussion, it was stated at this does not set a good example for ier shippers. It was also recommended at laminated side stakes, now approved r use only in section 5 of the Loading les, be permissible for any lading requir- side stakes. "Your Committee feels that minated stakes will have more strength n solid stakes," the Committee reported. Flat cars are frequently equipped with ke pockets which have such sharp edges t they cut lading bands. This condition ll require action, H. L. Price, mechanical istant, Santa Fe, warned.

Calling attention to Paragraph b of Gen- l Rule 8 concerning idler cars used with g shipments, the Loading Rules Com- ttee reported that the required minimum arance of 4 in. between the overhanging d and the deck of the car is insufficient. hump yards and on other tracks with tical curves, this has proved to be in- equate. "It is the opinion of this Com- ttee that the rule should be modified to quire a greater clearance between car ks and lading in order to prevent derail- nts," they concluded. It was pointed out that the wording of the rule is "to maintain 4 in. clearance" and that this might imply that greater clearance should be provided initially, even under the present regulation.

H. L. Hewing, superintendent of inter- change, Chicago Car Interchange Bureau, reported that Loading rules for open-top and closed piggyback trailers are to be issued soon. They will not be mandatory, he said.

Interchange Rules

The interchange rules for piggyback trailers which became effective on January 1, 1961, require some revision, according to the CDOA Committee on Road-Rail Transportation. "This Committee believes it is time that they be re-evaluated. These rules were formulated as a guide to a fair and proper adjustment of all questions arising between trailer owner and handling company, with the intent of making trailer owner responsible for, and chargeable with, repairs necessitated by ordinary wear and tear in fair service."

The Committee on Interchange Rules reported that, in addition to several revisions in the piggyback code, the "Trailer Interchange and Safety Inspection Form, J-1" should be eliminated. The Committee called it "impractical, unworkable, and unenforceable." Subsequent discussion indicated that many others had reached the same conclusion. It was pointed out that it is based on a form used for interchange between truck lines and is not readily applicable for railroad interchange. The safety inspection of such ICC items as trailer lights and brakes cannot be made while a trailer is loaded on a piggyback car. The J-2 form can take care of visible damage to trailers, and interchange inspectors are unable to cover many of the items specified in the J-1.

K. H. Carpenter, superintendent car department, Erie-Lackawanna, said that the J-1 is impractical. He said that the so-called "Cleveland Agreement" negotiated five years ago by roads then interchanging piggyback traffic had proved to be a workable plan. When the AAR was considering its own piggyback interchange code, these lines recommended that trailer owners be made responsible for ordinary trailer damage. He said that the present piggyback situation parallels that which prevailed in freight car interchange when original rules made the handling line responsible for ordinary wear and tear. This has gradually evolved to make these conditions primarily owners' responsibility.

To simplify billing procedure by eliminating counterbilling in cases of wrong wheel application and to prevent evasion of responsibility for application charges in such instances, the Committee has recommended changes in Interchange Rules 5, 10, and other applicable rules. To be eliminated would be present requirements that a defect card be furnished by repairing line for application of wrong wheels. In lieu thereof, it would be required that repairing line make no charge for application of wrong wheels when change is due to owner's defect.

Another proposal, covering Rule 94, second paragraph, would include labor and material for associated parts which must be removed from cars in making repairs. The Committee reported that "extensively damaged cars are being carded home where it is uneconomical to repair them because of the cost of renewing flooring and lining during the course of making repairs. Total cost exceeds or approaches net depreciated value less salvage. To collect on defect card under the present rule, repairs must be made or the car owner is forced to lose the difference between the amount he can bill and the net value of the car. Car owner should be privileged to bill for labor and material for all undamaged associated parts which must be removed and replaced in connection with repairs; the charge should not exceed the net depreciated value of the car less salvage."

To extend the service life of axles, the cost of which is rising steadily, the Committee on Wheels, Axles and Wheel Shop Practices proposes the elimination of step size requirements in axle turning. "The net effect of this proposal will be to allow axle lathes an additional 0.080 in. of journal diameter below the current G-1 and G-3 step sizes to clean up an unserviceable journal," the Committee stated.

When it is necessary to refinish an axle, only that amount of metal sufficient to restore the journal surface to proper operating condition would be removed. Rule 86 of the Interchange Code and the Wheel and Axle Manual would be amended. "To live with this proposal," the Committee said, "all references to the G-1, G-3 and G-5 axle dimensions, as well as the tabular annotation thereto, must be necessarily eliminated. This will in no way affect the step size bearings, the controlled clearance gages, or the current rules and procedures involving their use and function."

The proposed form of the second sentence on page 204, Interchange Rule 86, would be " . . . Where journal diameters are such that it would be wasteful of labor and material to adhere to these tolerances, it is permissible to reduce the diameter of journals on secondhand axles as much as is required to restore the axle to serviceable condition, provided the diameter is maintained within the shop condemning limit . . . "

Elimination of the step size journals is only the first phase of a program which should also see elimination of step-size journal bearings, according to C.W. Kimball, chief of car inspection of the Southern. He said that, if the step bearings were abandoned, it would be possible to reduce stocks, avoid application of improper size, and make it unnecessary for carmen to use the delicate journal gages.

In 1957, the CDOA Committee on Mechanical Refrigeration originated a tabulation of all mechanical refrigerator cars

giving data on the make and model of engine, compressor, thermostat and electrical system, and on the type of air distribution, temperature range, and number of refrigerating units. This tabulation was taken over in 1960 by the Car Service Division of the AAR which now publishes it annually. This year, the Committee has prepared a similar listing of piggyback trailers with mechanical refrigeration equipment.

Recognizing, as with the mechanical refrigerator cars, that the servicing and maintenance personnel of the railroads must take care of piggybacked refrigerated units in trouble on their railroads, the Committee began compiling and tabulating the information as to ownership, identification, types of engines and refrigeration equipment, kind of fuel, and capacity of fuel tanks for railroad-owned or railroad-operated equipment presently in use under Plan 2. Although practically all trailers in the country may be handled piggyback under some plan, it was impractical to compile such extensive listing. It is anticipated by the Committee that the tabulation of trailers and containers of the mechanically refrigerated type used under Plan 2 will grow in size and completeness, eventually being taken over and published annually by the AAR Car Service Division.

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1961 and 1962

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Locomotive Maintenance Officers



O. L. Hope, MP



R. E. Harrison, SP

Spot Shops Offer Diesel Economies

One of the major problems facing railroads is the labor cost involved in diesel-electric locomotive maintenance, the Shop Equipment Committee of the Locomotive Maintenance Officers Association reported. Essential to lowering this cost is full utilization of man-hours at a diesel maintenance facility. A few factors involved in lost man-hours are inadequate tooling, improperly trained personnel, inefficient plant layouts, and travel by mechanics to and from job assignments.

While not completely eliminating non-productive time, some railroads now operate spot systems for periodical inspection and repairs to diesel-electric units. The committee has studied three basic arrangements for these progressive shops:

- The straight-through shop;
- The split-track shop;
- The roundhouse spot shop.

On the straight-through spot system a diesel unit travels along one track through a series of work stations, at each of which a predetermined amount of work is assigned. The basic idea is to bring the locomotive units to the men, tools, and material, eliminating unproductive time and safety hazards. The advantages of this type of shop are:

- Minimized movement of units;
- Low construction costs, assuming a shop building is available;
- Good parts flow.

Two principal disadvantages are that units are captive, moving through all "spots" regardless of repairs needed, and units are also "bottlenecked" while waiting their turn to enter the line.

The split-track shop, as proposed by the committee, would have three tracks through the shop with a transfer table connecting them just beyond the first station. A unit could go to any one of the three inspection positions and then, utilizing the transfer table, traverse a light, a medium, or a heavy repair line. One of the three tracks beyond the transfer table would be permanently assigned for each of the three types of work. The advantages of this arrangement are:

- Units requiring only light servicing could be returned to service quickly;
- Compact facilities for good control and supervision;
- Good parts flow.

Disadvantages include the high construction cost and inability to use existing facilities readily. While the split-track plan does not have the disadvantages of the straight-through system, installation of a transfer table in an existing shop is quite costly.

The roundhouse spot shop, as used on one railroad, is a six-position operation with two pits per position. The workmen, tools, and materials are located on a platform between each pair of pits. First, a unit is placed on a vacant pit at Position 1. Utilizing the turntable, it then moves to a vacant pit at Position 2, and so on.

Some of the advantages offered by this plan are:

- Workmen are not idle while the line is being moved because there can be a second unit at each position on which the workmen can go to work.
- The bottleneck previously discussed is partially eliminated, because there are two pits at each position.
- Units are not trapped. If a unit does not require the work normally performed at a particular position, the position can be bypassed.
- Many railroads have roundhouses and turntables which could be utilized.

Many variations from these basic arrangements are possible. The basic plan and the variations that will be most suited to a road's needs will be found by studying the factors involved.

Basic factor in determining the number of stations required and how to man them is the total number of diesel units to be inspected or maintained in a given period. With proper planning, a more even work flow will result, and lower maintenance costs and a substantial improvement in locomotive condition can be achieved.

An important point in planning a spot shop for scheduled maintenance is that it must function like any assembly line. Work at each station must be assigned, even the most minor operations. The work must be planned so that each station will have a definite amount of work which can be properly completed in the alloted time with the personnel assigned to the location.

If careful control is not exercised, bottlenecks can develop in spot systems. Even routine operations may seem to involve considerable out-of-service time for locomotives. Consider a shop with a four-unit straight-through track which allows 1 hr at each spot. Five units arrive at noon. The first unit will be placed on Position 1 at 12 noon, and will be outshopped at 4 pm. The second unit must wait an hour before being placed on Position 1 and will be outshopped a 5 pm. The last unit is placed on Position 1 at 4 pm and will not be outshopped until 8 pm.

Shops equipped with adequate tools and equipment and having properly trained per-



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sonnel make it possible to better utilize man-hours and to reduce time lost between job assignments. A more even work flow can produce lower maintenance costs and substantial improvement in the condition of motive power.

Subsequent discussion about spot systems for single-end shops indicated that the system's savings might easily justify the construction of a through track, or even a new building.

F. H. McHenry, master mechanic, New York Central, commented on the bottleneck problem discussed by the Committee: "That is no different from running any type of shop but is a point that must be closely controlled." He reported that the NYC Collinwood, Ohio, shop (RL&C, August 1961, p 30) calls for units one week in advance, seeking to have them arrive on a specific day so that shop loads can be balanced. At Collinwood, seven units are completed each 8-hr shift. The shop maintains 675 locomotives on a single-track, 6-spot system. Mr. McHenry indicated that the units were being maintained with approximately 250 fewer people and that their condition was as good, or better, than had been the case when they were assigned to various shop

R. E. Harrison, manager, maintena... planning and control, Southern Pacific, s... that when rearrangement of the spot fac... ties at his road's Sacramento, Cal., shop completed, it is expected that maintena... will be done with only 25% of the for... necessary to maintain the locomotives som... years ago at several different points.

K. L. Pollitt, manager, system assem... shops, Southern, said that 60 to 70% sa... ings are resulting from the spot shop sy... tem maintenance as compared to old-sty... diesel shops.

Air Compressor Loading Determines Proper Lubrication

A well refined straight mineral oil, either naphthenic or paraffinic, in the proper SAE range will give good lubrication for normal air compressor operation, K. D. Relyea, Texaco, Inc., reported to the Air Brake Association. Other oil requirements for optimum performance include heat and oxidation stability, minimum carbon-forming tendencies, low volatility, and suitable flash and pour points. While some roads still use diesel engine lubricating oil in air compressors, many others are using oils considered better suited to the conditions peculiar to air compressor operation.

Proper oil conditions within the compressor should be accepted as a major feature of its maintenance. Oil condition generally reflects the performance of the compressor; excessive oxidation rates indicate abnormal operation.

It is most important that the oil be changed in the compressor crankcase when oil condition indicates this is necessary, Mr. Relyea said. To prevent impending failure, a noisy bearing is replaced when it is first discovered. Oxidized compressor oil doesn't "ring an alarm bell," but it can tell the same story as the noisy bearing. Frequently when the warning is not heeded, the end result is a compressor failure.

A 50% increase in viscosity at 100 deg F in a naphthenic oil and a 25% increase in a paraffinic oil are conservative limits. In a given grade, a naphthenic oil (Coastal stock) is higher in specific gravity, lower in API gravity, and lower in flash point than the paraffinic oils of the Appalachian region. Viscosity of naphthenic oils is more responsive to temperature changes.

Arbitrary time limits for oil changes do not take into consideration the operation of individual compressors and should be used with caution, Mr. Relyea said. Heavily loaded, air-cooled compressors may need an oil change every 30 days. Lightly loaded compressors may operate for 6 mos.

When oil is drained, the crankcase and oil screen should be cleaned and crankcase breather checked for proper operation. Debris and oxidized oil left in the crankcase can hasten oxidation of newly added oil.

Good air compressor lubrication starts at the air intake; air-borne dirt is a primary cause of wear. Oil seals, oil pump, oil pump screen and relief valve, crankcase, breather and cylinder assemblies must be in reasonably good condition to control oil consumption and blow-by. Clean, properly seated valves and clean, water-free intercoolers are essential to good performance and control of heat which is the primary cause of oil degradation. Maintenance of proper oil level and pressure is also an important item which bears daily checking.

The choice of a satisfactory compressor oil is a compromise between conflicting requirements and properties, Mr. Relyea concluded. The naphthenic oils are more volatile. They burn more cleanly and produce smaller and softer carbon deposits. However, they are more viscous at low temperatures. The paraffinic oils have greater inherent oxidation resistance, but will produ... more and harder carbon deposits. Wh... handling of an additional oil encourages th... use of diesel engine oil with its metallic as... constituents, this is not desirable because of... the tendency to develop deposits.

Operating conditions and practices var... sufficiently between different roads so as t... make one type of oil more acceptable tha... another. There are indications that th... ability of mineral oils to lubricate com... pressors satisfactorily when operating a... high discharge temperatures may be ex... ceeded. Design modifications may be nece... sary to keep operating temperatures in th... region where petroleum oils will perfor... without undue deterioration.

Journal Problems Need More Attention

Freight-car journal performance improved in 1960 over 1959, with average miles per hot box set off between division terminals rising to 225,975. Cars equipped with lubricating devices averaged approximately 690,000 miles per hot box, while those not so equipped averaged only 121,200 miles per hot box, the Car Department Officers Committee on Car Lubrication reported. "Improvement in performance can be attributed to the increase in application of lubricating devices and not to general maintenance and servicing," the Committee concluded.

Careful selection of lubricating devices also influences performance. A survey of several railroads revealed lubricating devices with top performance are averaging approximately 4,000,000 miles per hot box with some roads obtaining 15,000,000 miles per hot box.

Competition has reduced prices so that good lubricators can now be purchased for less than $25 per car set, it was reported. The Committee went on to state that an extension of the repack period would make a low priced, one-use lubricating device very attractive. A large number of cars equipped with conditionally approved devices are now completing a 36-month repack test, and the results have been encouraging. The optimum repack period would be one which corresponds to the AB brake cleaning period, presently 4... months. Cover and core materials of mo... lubricating devices will withstand 4... months of operation, but it is doubtful ... they could be renovated and operated f... another four-year service period.

Roller Bearings

"Performance of roller bearings con... tinues to be excellent," the Committee sai... There were 51 roller-bearing hot boxes re... ported in 1960 and only 146 in the past s... years. In 1960 there were 2,713 bearing... removed for reasons other than hot box... from the 76,674 roller-bearing-equipp... cars in interchange service.

Two major problems encountered on re... pair tracks since the number of roller-bea... ing-equipped cars has increased are:

- Wheel replacements for cars havi... wheel defects;
- Removal and shipment of roller-bea... ing wheel sets to distant points for exam... nation after being involved in derailment...

It appears that the latter may become on... of the major cost items in roller-bear... operation, according to the Committe... Overall roller-bearing maintenance cost in... freight operation is yet unknown. The Com... mittee urged all roads to follow their r...

(*Continued on page 44*)



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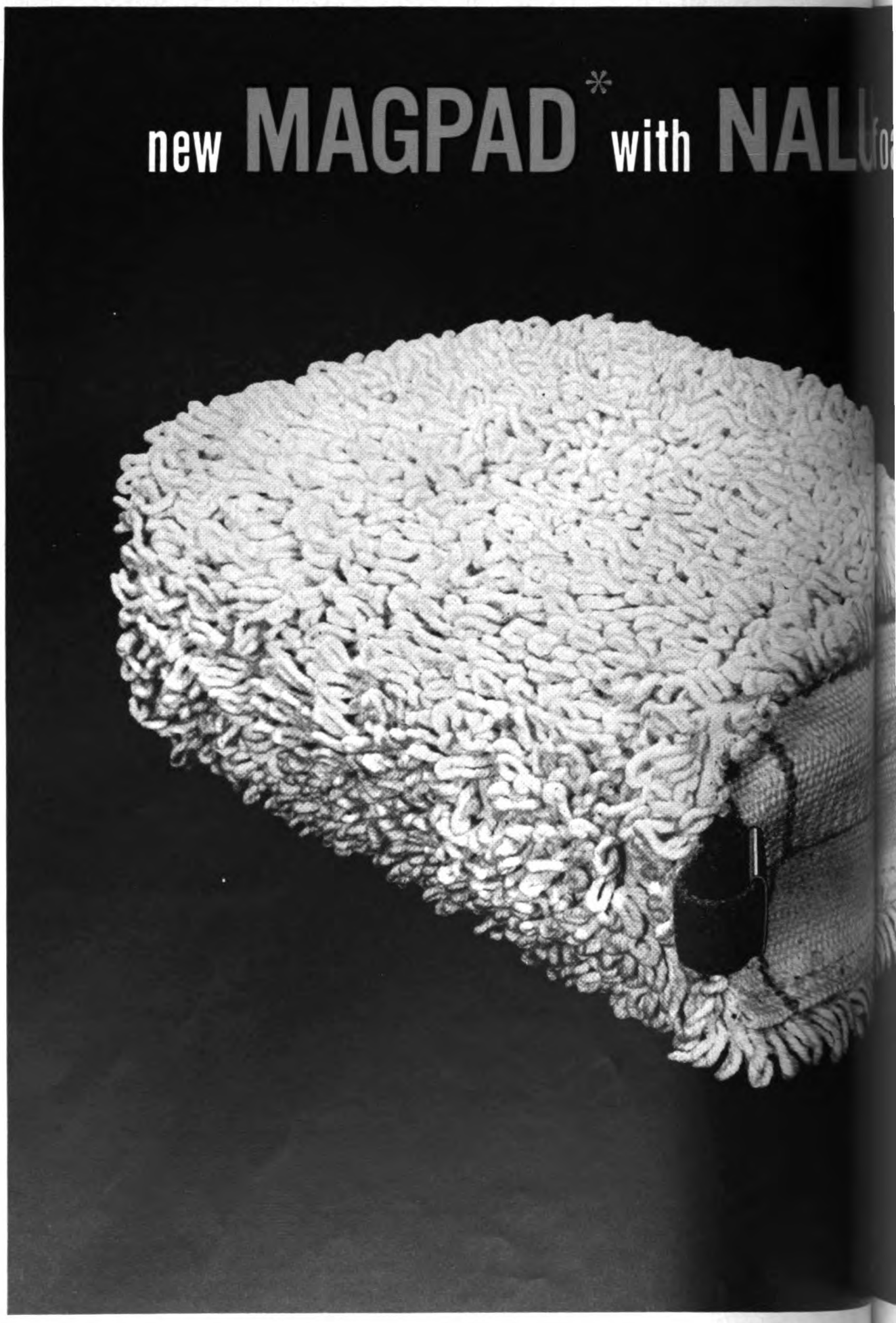
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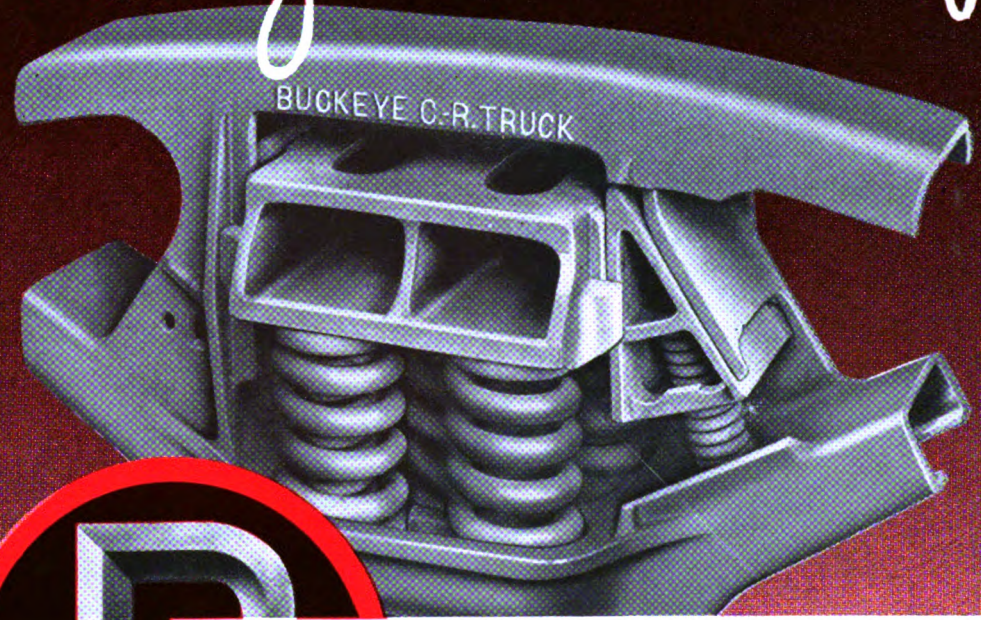
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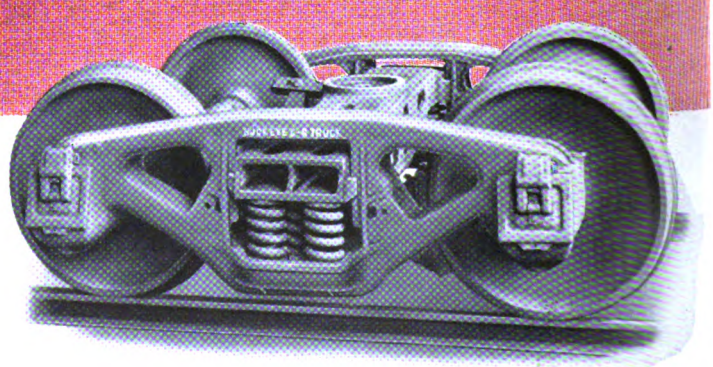
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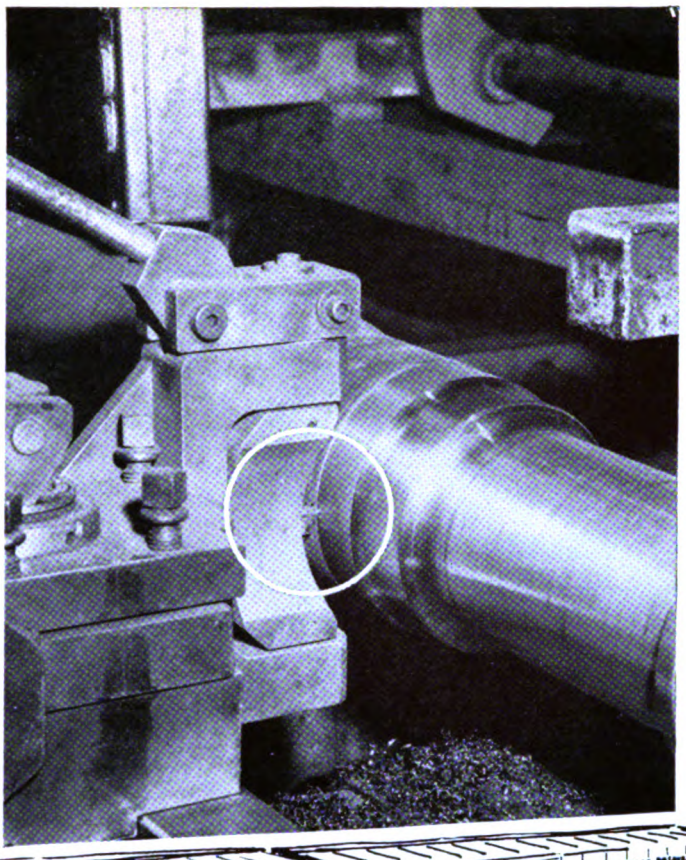
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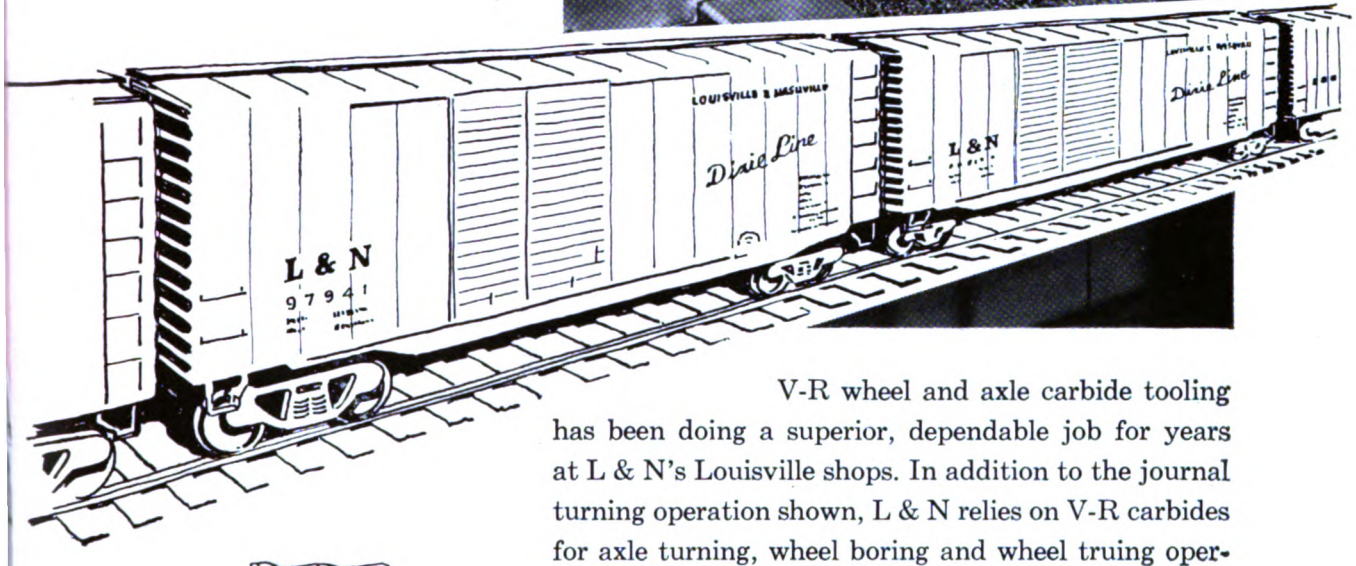
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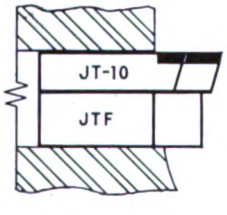
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L & N uses this new style JT-10 Journal Turning Tool with Style JTF Filler Block for greater economy with less grinding time.

V-R wheel and axle carbide tooling has been doing a superior, dependable job for years at L & N's Louisville shops. In addition to the journal turning operation shown, L & N relies on V-R carbides for axle turning, wheel boring and wheel truing operations. You, too, can rely on V-R.

With over 30 years of carbide research, engineering and manufacturing experience V-R combines the best in manufacturing facilities and processes with practical knowledge to control quality from the ore to the finished product.

Write for V-R Wheel and Axle Tooling Catalog R-1 today!

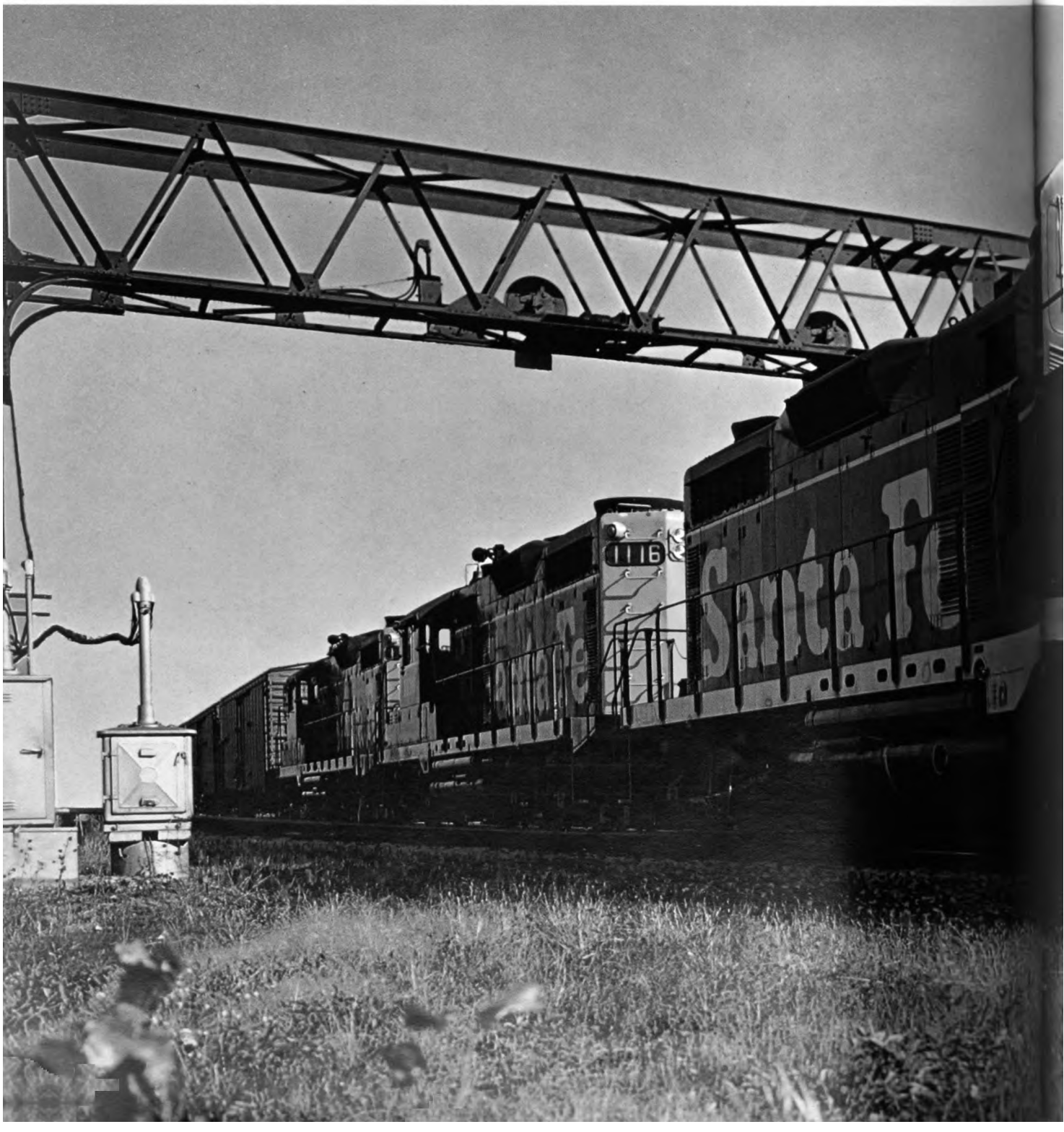
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FIFTY MORE GP-20's Ordered by the SANTA FE



Fifty more General Motors 2000-hp GP-20's are joining the Santa Fe fleet of twenty-five GP-20's at work pulling the freights between Chicago and Kansas City. By turning in fifty 1350-hp freight locomotives, the Santa Fe is exchanging 67,500-hp capacity for 100,000-hp—a gain of 48%. This added capacity enables the fifty new GP-20's to do the work of seventy-four older FT's.

This is the essence of the General Motors Locomotive Replacement Plan.

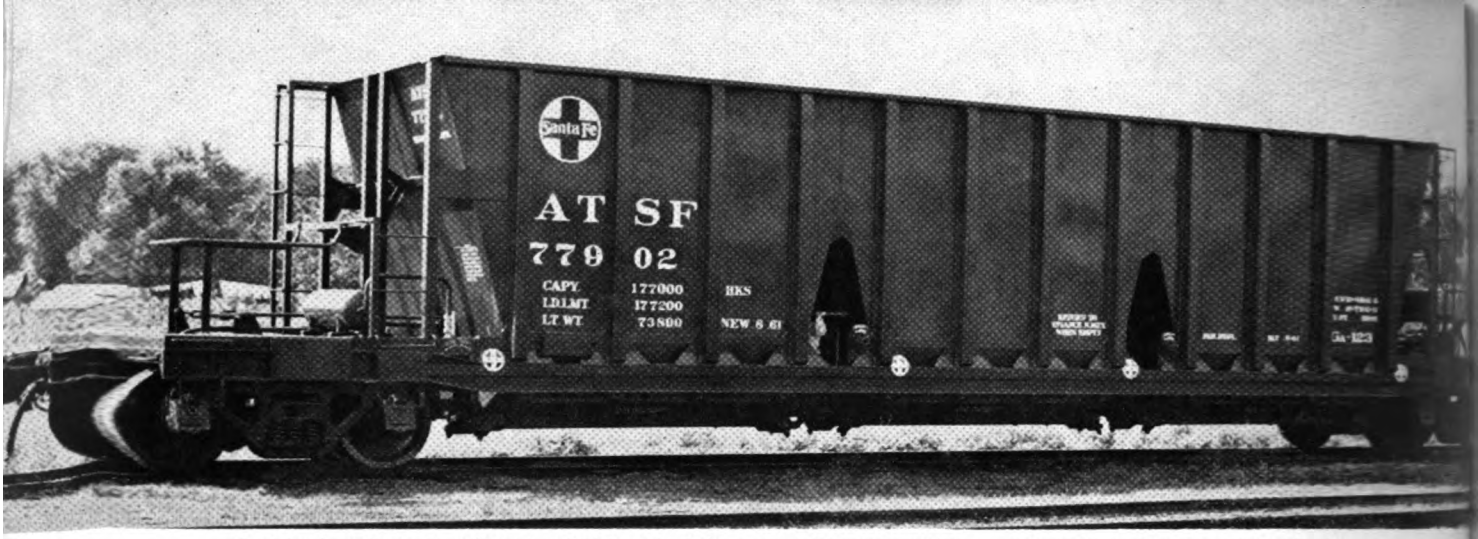
ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS • *HOME OF THE DIESEL LOCOMOTIVE*

In Canada: General Motors Diesel, Limited, London, Ontario

GENERAL MOTORS LOCOMOTIVES



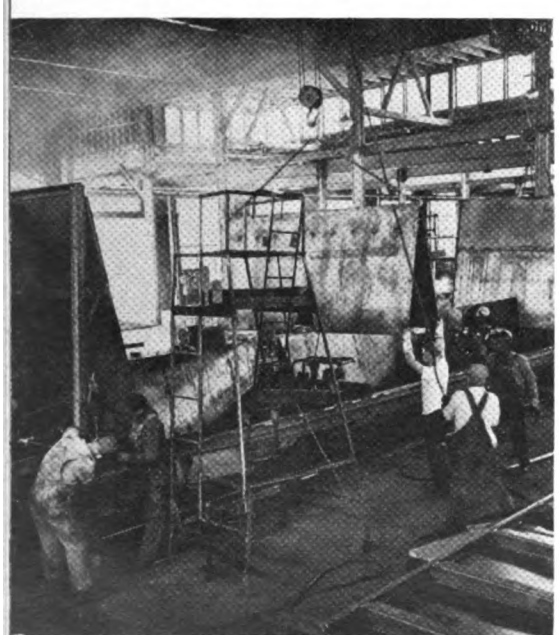


Coal haul on Santa Fe will be handled by 60 of these special hoppers which are now under construction at road's shop.

Hoppers Designed for Fast Unloading



Four-way valve controls simultaneous opening of all six sets of hopper doors on the car.



Steep slopes of cross ridges and longitudinal hoods are evident during assembly at Topeka.

Hopper cars now being built by the Santa Fe for a coal movement from New Mexico to a public utility in southern Arizona have air-operated drop doors. They will be used in conjunction with a remotely controlled 600-hp switcher which the utility has ordered for use at its power station. Coal will originate along the Santa Fe main line and will be delivered to the generating station where the "automatic" locomotive will take over.

The 92-ton, all-welded cars have 75-deg slope sheets for free flow of the lading. Each car has six air-operated, longitudinal dump doors, three on each side of the center sill. They can be opened in 6 sec and closed in 12 sec. Each of the three Chicago Pneumatic air motors operates two sets of the doors. All three motors can be controlled by either of two operating valves located at diagonal corners of the car. Door operating mechanisms, with exception of air motors, were supplied by Enterprise.

The locomotive will be operated from a special, remotely located control console. Signals from the control will cause the locomotive to move a string of the loaded cars to a dumping pit and will initiate a brake application when the first car is spotted over the pit.

Unloading will then be started. First step is to throw a safety latch which locks the four-way pneumatic operating valve. The valve handle is then moved to *Unload* position from *Neutral*. When the coal has been discharged, the handle is moved to *Close Door* position and, a few seconds later, to *Neutral*. The safety latch is then thrown to secure valve handle in neutral position. This safety latch eliminates any possibility of accidental dumping of loaded cars. A separate air line from the locomotive feeds a special reservoir on each car and, through it, the air motors which operate the doors.

When the first car is empty, brakes on the cars and locomotive will be released, and the train will be advanced to place the second car over the pit. The remote control package installed on the locomotive is furnished by Union Switch & Signal.

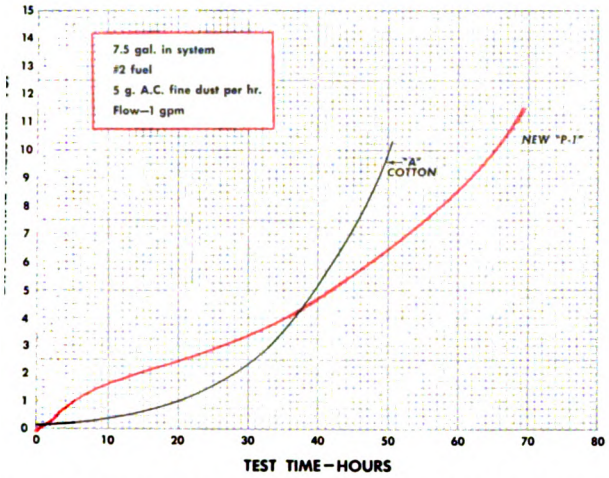
Cars are designed specifically for the special coal service with its high-speed dumping operation. Inside body length is 39 ft 9 in.; inside width 9 ft 59⅝ in. Height from the bottom of door opening to top of side angle is 10 ft 5 in. and height from top of rail to top of top side angle is 11 ft 10½ in. Length over strikers is 56 ft 11 in. Car wheel base is 52 ft 10 in. Capacity is 3,588 cu ft.

The Z-26, 41.2-lb center-sill sections, the side sheets, and the door pans are all low-alloy, high-tensile steel. Side sills are 10-in., 28.5-lb channels. There are twelve 20-in. x 10-ft discharge openings arranged in pairs. The car is equipped with friction draft gears in 25-in. pockets.

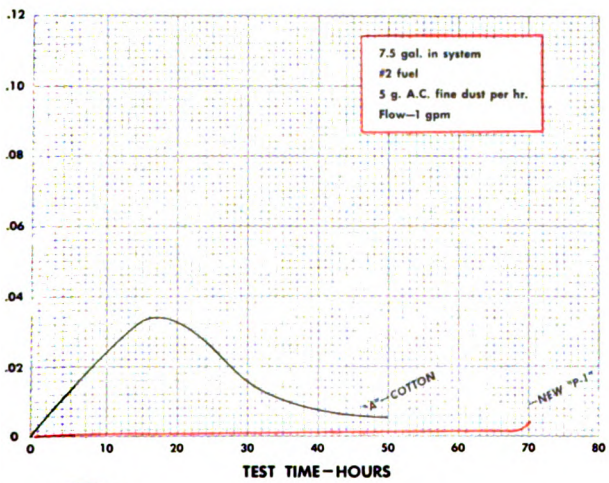
Trucks are ASF A-3 Ride Control with 2½-in. travel springs, 6½ x 12 axles, and 36-in. multiple-wear, wrought-steel wheels. Unit brake beams, Atlas lubricator pads and DO journal stops are used. Other equipment includes Westinghouse air brakes, Champion - Peacock hand brakes, and SAB slack adjusters.

Applied Research in Filtration Saves Money for Railroads, too!

NEW CLEANLINESS IN FUEL AND LUBRICATING OILS EFFECTS MAJOR ECONOMIES IN DIESEL OPERATION



ıst to demonstrate the comparative efficiency (retention of contamiants) and flow characteristics (pressure drop) of standard 2nd stage ıel filter cartridge "A" versus the new WIX P-1 pleated paper cartdge. With a condemnation limit of 10 psi, cartridge "A" indicates on ıe chart above a life cycle of 50 hours versus 66 hours for the new 'IX development. Note that, throughout its longer service life, the 'IX cartridge never exceeds trace amounts as opposed to the perırmance of cartridge "A" as shown on chart below.





Shown at the left—WIXITE Primary Fuel Filter Cartridge. At the right—the New WIX P-1 Second Stage Fuel Filter Cartridge whose outstanding performance is pictured above.

When a few specks, no larger than the point of a pin, can disrupt the entire schedule of a railroad system, the economic importance of clean fuel oil is well illustrated — but, in only one of its aspects. Engine trouble, caused by fuel failure, is a catastrophe. The day in and day out erosion of vital engine parts, which is the progressive penalty of contaminants in lubricating oil, may be equally costly. Combined, these problems represent significant sums in the annual operations budget.

Research and development by WIX, based on years of study, have made marked progress in the areas of both fuel and lubricating oil filtration. WIX Filter Cartridges were the first to supplant the old hand-filled waste packed filters which today are pretty generally recognized as "extravagant" economies.

Today WIX offers comprehensive coverage of all oil filtration needs on diesel locomotives . . . lubrication, primary and secondary stage fuel. This coverage embraces many filtering media so that engineering can prescribe the precise filtering formula to suit the engine and its characteristics as well as the service or environment in which it operates.

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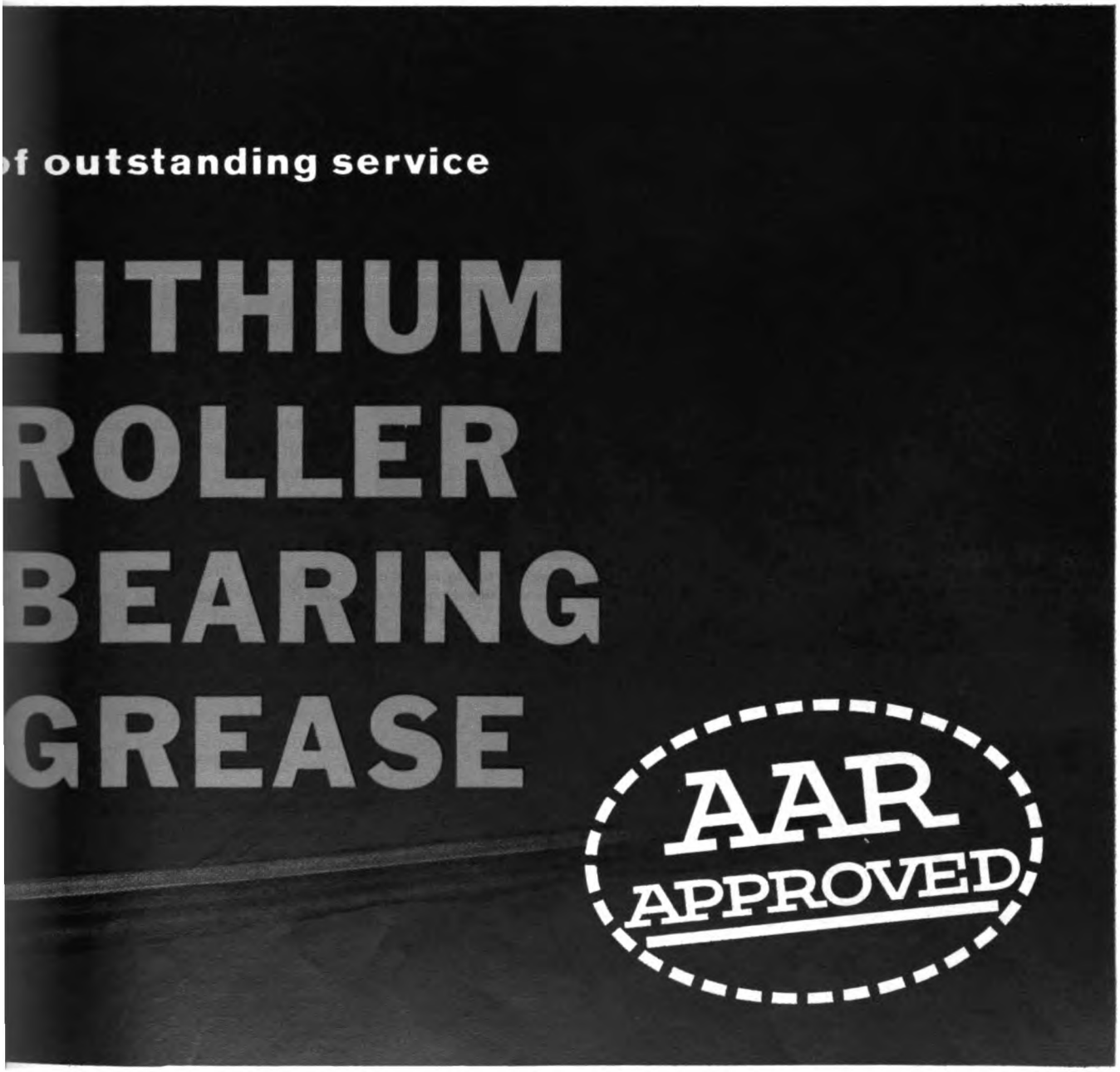
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SINCLAIR L-340 LITHIUM ROLLER BEARING GREASE is a smooth uniform product, manufactured of highly refined mineral oil compounded with lithium soap. • **SINCLAIR L-340** is highly resistant to oxidation, protects against rusting and is non-corrosive to bronze and other bearing metals. • **SINCLAIR L-340** lubricates readily

NO. L-340



at low operating temperatures and will not thin out at high temperatures nor under heavy loads. • **SINCLAIR L-340** has, after millions of miles of service, proved itself outstanding for car and locomotive journal roller bearing lubrication.

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SINCLAIR RAILROAD LUBRICANTS

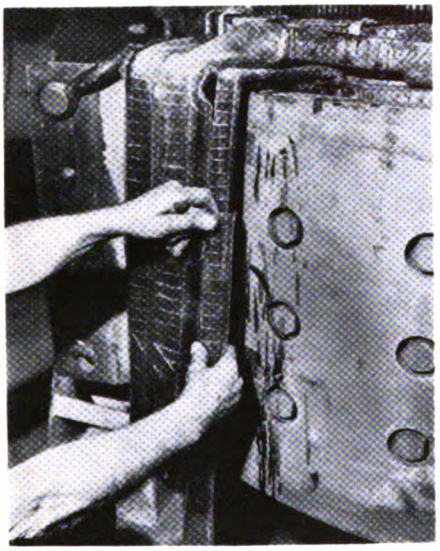
SINCLAIR REFINING COMPANY, RAILWAY SALES • NEW YORK . . . CHICAGO . . . HOUSTON

Vinyl Tubing Protects Insulation

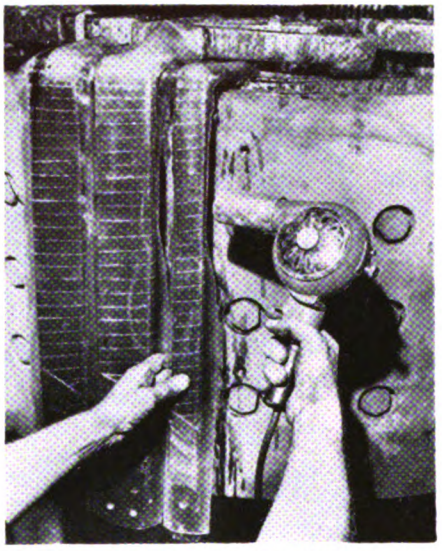
Heat-shrinkable vinyl tubing is being applied by the New York Central as a protection and insulation for the leads and bus bars of locomotive main generators. Applied over the cable insulation on leads and over the tape insulation on bus bars, the vinyl forms a tight protective sleeve to keep conductors moisture free. The vinyl, an electrical insulation in itself, provides added electrical protection as well as moisture protection. Along with excluding moisture, it also prevents the penetration of oil and grease into the insulation.

During normal operation and maintenance, water and oils collect in the pans below generators, soaking into insulation. Often in the past, failures in these leads have occurred long before major maintenance was due on the locomotives. The problem was annoying and costly not only because of the labor and shop time required for repairs, but also because of locomotive out-of-service time. In an attempt to correct the situation, the Cen Collinwood shop, near Cleve Ohio, began in 1960 to apply shrinkable tubing to all gener coming in for repair.

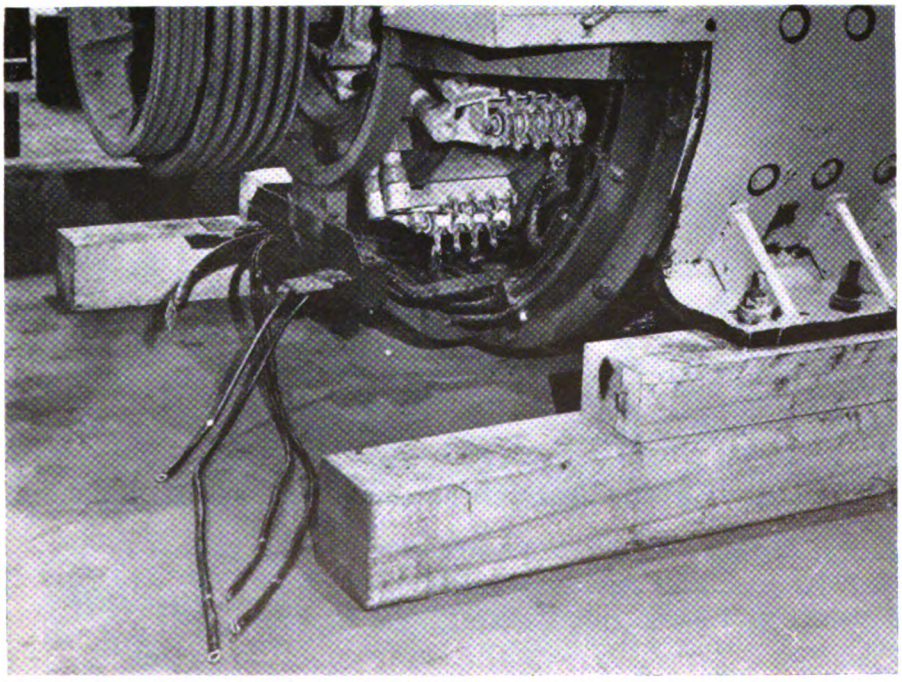
The tubing—Scotchtite brand reactive tubing No. 3025, a clear plastic—is applied wherever pos to leads and bus bars as the first following reassembly of overha generators. Because the tubing is size before heat is applied, it ca slipped easily over the cable jac and bus bar insulation. To fur ease application, a dry talc is app to the flexible leads as a lubri The proper size for a snug fit is sele from the various diameters avail Pieces of tubing are cut approxim 1¼ in. longer per foot of materi quired to allow for longitud shrinkage.



Vinyl tubing slips easily over the glass tape insulation used on generator bus bars.



Dryer is used for shrinking the tubing in place. Heating is started at attached end of bus bar.



Overhauled generator, with its vinyl-protected leads, is ready to be replaced in locomotive. The conductors have been given added protection against moisture grounds.

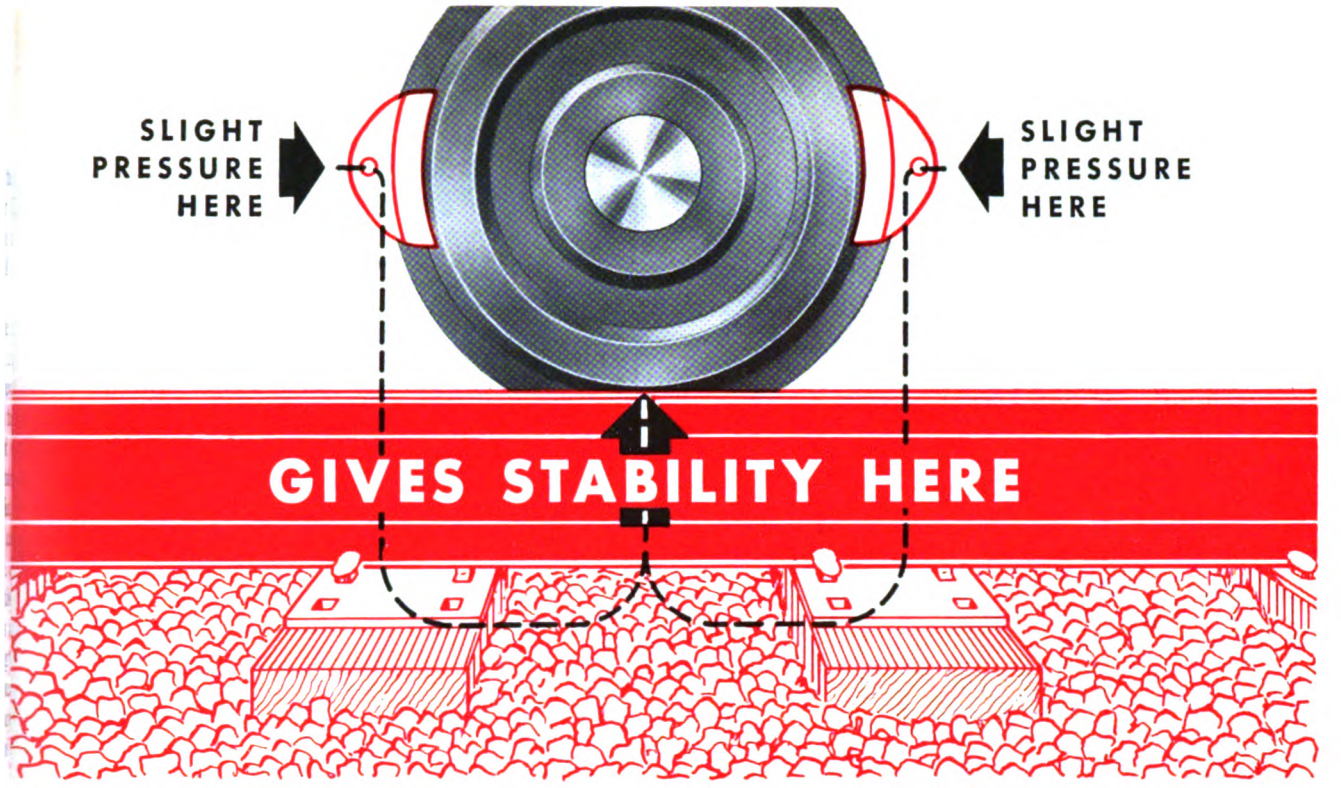
Heat Shrinking

With the tubing in place, it is sh to fit with a heat gun, starting a attached end of each lead or bus The tubing can then be shrunk le wise onto the cable as the shrin operation progresses toward the or outer, end.

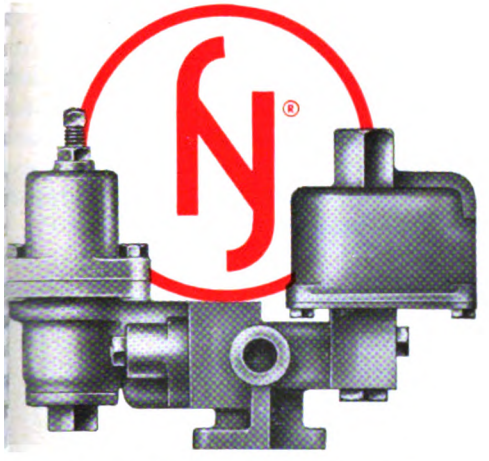
Prior to the varnish dip and ba cycle, the vinyl-covered leads pulled back and tied in a posi where no part of the tubing tou metal parts of the generator. H transmitted by contact with metal ing baking would otherwise burn puncture the tubing. The generat then dipped and baked at 325-33 F for a period of 8 hr. After ba the ends of the tubing are sealed a liquid neoprene to prevent entr moisture or oils which could be w up by the insulation.

All bus bar and cable clamps coated with liquid neoprene at time of installation to form a con ous seal that bridges from the cl to the vinyl sleeving.

The procedure is presently in us D-4, D-12, and D-15 generator EMD freight, passenger, and ge purpose diesel locomotives. P liminary indications show that added protection provided by h shrinkable vinyl will prevent gro ing by moisture and oil, helping t duce locomotive maintenance out-of-service time.



IOW-Locomotive Wheel Slipping Can Be Controlled!



The Wheel Slip Controller and its associated devices can be applied to all existing air brake systems *with the minimum of modification.* Write for Circular 103 giving full information and installation diagrams.

The correction of "Wheel Slip" on Diesel-Electric Locomotives has been the subject of continuing study by The New York Air Brake Company. Now, you can have greatly improved locomotive performance and train operation with completely automatic, low cost —

PNEUMATIC WHEEL SLIP CONTROL

The Wheel Slip Controller responds to the existing wheel slip detection relays and within one-half second automatically applies a light brake application to the slipping locomotive unit. This in turn corrects most slips and restores the slipping wheel to train speed *without reduction in power.*

It comes to you, following thousands of miles of road tests over steep grades and frost-coated rails. In one test run of 1,400 miles it quickly and effectively corrected 95% of the slips with no reduction of power being delivered to the traction motors. Slips were corrected in 1 to 2 seconds from the time of indication. On the 5% not corrected by a pneumatic brake application, the slip was corrected by power reduction in the normal manner.

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THE NEW YORK AIR BRAKE COMPANY

230 PARK AVENUE • NEW YORK 17, N. Y.

THE
MAGNUS
METHOD

DRI-
GLIDE



Aerosol* Replaces Entire Luberizing Setup!

Leading railroads have given their stamp of approval to this new piston-luberizing method after months of complete tests.

The multiple tanks and drying ovens previously used to luberize overhauled cast iron pistons have been eliminated. A man's full time has been released for more productive work. And, a bottleneck has been eliminated. It used to take 8 hours to luberize 40 pistons; the same amount can now be done in 10 minutes!

Just 15 Seconds Each!

With Magnus Dri-Glide, the machinist turns down the top ring groove, then simply sprays the outside of the piston with Dri-Glide. It's ready for re-use.

*Also available in bulk.

GET THE FACTS about this modern cost-slashing Magnus Method.

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CHEMICAL COMPANY INC.
77 South Ave., Garwood, N.J.

Please send full details on new Magnus Dri-Glide.

Name _____

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Piggyback Car Has High-Capacity Gears

A multi-purpose 85-ft, 70-ton piggyback car with hydraulic draft gears, has recently been completed by Bethlehem Steel. The prototype, a modification of conventional models, was designed and built to achieve two primary objectives:

- Expand the utility of the typical piggyback car by using "universal" hardware, making possible transport of highway trailers, containers, pallets, or racks interchangeably or in various combinations.
- Utilize the latest in freight-car equipment, such as hydraulic cushioning devices and truck-mounted air brakes.

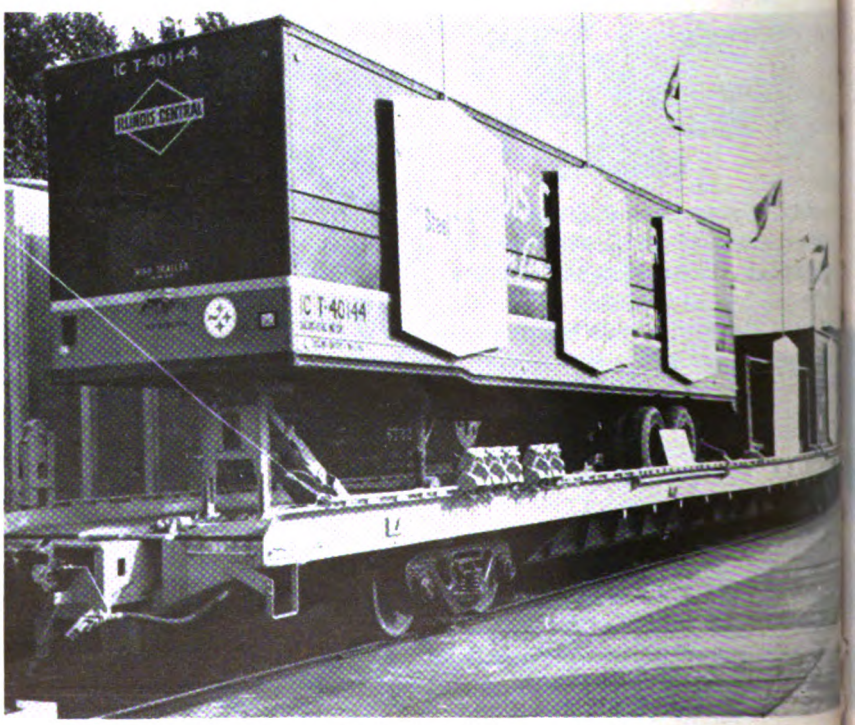
Built at the Johnstown, Pa., plant, the car can handle three types of lading—container, pallet and trailer—simultaneously and was so loaded when shown at the Allied Railway Supply Association exhibit in Chicago last month.

The long-travel, hydraulic and rubber cushioning built into the underframe reduces impact forces imposed on the car and lading, eliminating the need for individual cushioning of trailer hitches, container racks, and automobile racks. Positive anchoring for all of these major types of ... ping units simplifies deck cons... tion, gives greater loading flexib... and increases lading protection.

National Castings NH-24 ... gears are installed outboard of ... bolsters at the ends of the car. T... are combination hydraulic and ru... units having 24-in. hydraulic tr... plus 2 in. of rubber-cushioned t... in buff and 2 in. of rubber-cushi... travel in pull, designed specifically ... the end-of-car application on ... overhang piggback cars.

Universal tie-down hardware ... developed by National Castings ... been applied to the prototype pi... back car. These are the devices w... make possible the transportin... highway trailers, containers, and a... racks.

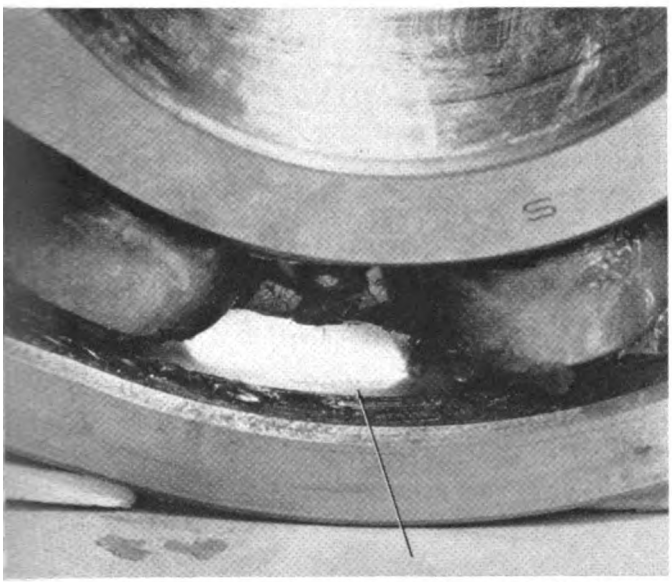
Some structural changes have b... made so the prototype differs f... the now familiar 85-ft piggyback c... These changes result in some re... tion in the weight of the basic un... frame structure and simplify the o... all design, reducing construction co... Wabcopak truck-mounted brake... recent development of Westingho... Air Brake Co., are used.



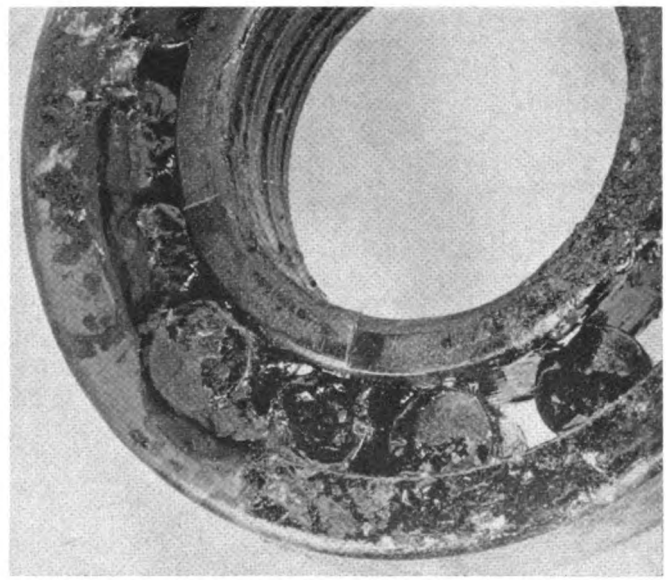
Trailer, rack and container can be handled simultaneously with universal "hardware."

18 Roll Them Out Like New

Motor and Generator Bearings



Electrical pitting is caused by current passing through bearing.



Lubrication failure caused by gear lubricant getting into bearing.

Bearings may seem to be simple machine parts, but they are very important. They are the components which determine whether your rotating equipment rotates. Even though they look so simple, they deserve careful attention and proper care.

Both sleeve and anti-friction bearings are used in rotating electrical equipment for railway applications. Each type of bearing has its place, but in recent years anti-friction bearings have taken over more and more of the jobs.

Sleeve bearings may be either plain or babbitted, with babbitted bearings used where the duty is more severe. Anti-friction bearings used in railway applications may be of different varieties—ball, cylindrical roller, tapered roller, or spherical roller. The electrical equipment manufacturer chooses the bearing best suited to the job, keeping in mind such things as size, assembly, cost, lubrcation, speed and capacity. For these reasons manufacturers' recommendations should be carefully followed when replacing bearings.

Generally, the anti-friction bearings used in railway electrical equipment are different from those used in machines built for other industries. These bearings usually have larger internal clearances than are standard for industrial-type bearings. This allows for the tighter fit on shafts and in housings required on railway equipment because of the shocks and vibration which are encountered in service. Railway-type bearings may also have a better class of cage. Additional, or larger, rollers or balls are sometimes used to give added capacity. These differences are designated by numbers or letters added to the basic catalog number stamped on the bearing. That is why using a substitute bearing which has *almost* the same designation as the original bearing may be dangerous. That extra letter or number missing from the designation of the substitute bearing is often the key to success or failure of the bearing application.

Railway bearings are selected to give long life under severe operating conditions. They are rated by statistical methods so their life expectancy is known. A small percentage will fail early. Many early failures occur in the first few hours of running. If new bearings are installed when a machine is rebuilt, the machine should be tested before being put into service. A couple of hours of operation in the shop may avoid subsequent disassembly or a road failure.

When a bearing is removed, it should be identified with the machine from which it has been taken. An easy way is to tag the bearing with the machine frame and armature serial numbers. If bearing trouble is discovered later, you can then check back for faulty machine parts that might have caused the trouble.

Lubrication

When a bearing is removed, the grease should be examined. Its appearance and condition will yield information about many things. It will tell whether the seals are adequate to keep dirt out and grease in; whether the operating temperatures of the grease has been excessive; whether the grease is providing lubrication to the bearings, and whether the interval between overhauls is too long or too short for the grease used. The same observations apply to the oil in oil-lubricated bearings. This may appear to be useless if you always seem to find everything all right. *But keep on looking;* some day a slight difference may show up during overhauls that

This is the eighteenth article in this series covering heavy maintenance of locomotive electrical equipment. Part 18 was written by C. F. Simon, Jr., Locomotive and Car Equipment Department, General Electric Co., Erie, Pa.

will be a timely warning of impending trouble.

Bearings may be lubricated either with grease or oil. Oil does a good lubricating job over a range of conditions, but sealing is a problem which can involve extra servicing and increased cost. Although grease is much easier to handle and is preferred by maintenance people, it does have definite speed limitations.

Based on his experience, the equipment manufacturer recommends the best lubricant for an application. While other lubricants may be suitable, go carefully in making any substitution. There are various tests to tell if greases which are called equivalent actually do meet the same specification. Two greases, equally good for a job, might not meet the same specification, or greases meeting the same specification might not give equal performance in service. It's a good idea to be cautious about adopting new lubricants. Make service tests with a small number of machines before changing over a large locomotive fleet.

Two things frequently happen to oil-lubricated bearings. Dirt may get in, causing wear, or water may collect in the bottom of the reservoir, with the risk of inadequate lubrication. Drain and flush the reservoirs of oil-lubricated bearings periodically.

There is a common idea that you can't use too much grease in grease-lubricated bearings. This results in the habit of giving a bearing an extra "shot" of grease for good measure. Too much grease can lead to overheating and failure. Seals in the housing prevent excess grease from leaking out; it has to churn until it gets hot enough to melt before the excess can escape. By then the overheated bearing may fail. If this does not happen, the grease may be permanently damaged so its lubrication life is greatly shortened.

Inspection

When a bearing is removed, it must be cleaned and examined to decide whether it is reusable. This should be done even if a bearing has failed. Inspection often tells why. If there are a series of similar bearing failures, an expert can be called in to pinpoint the cause.

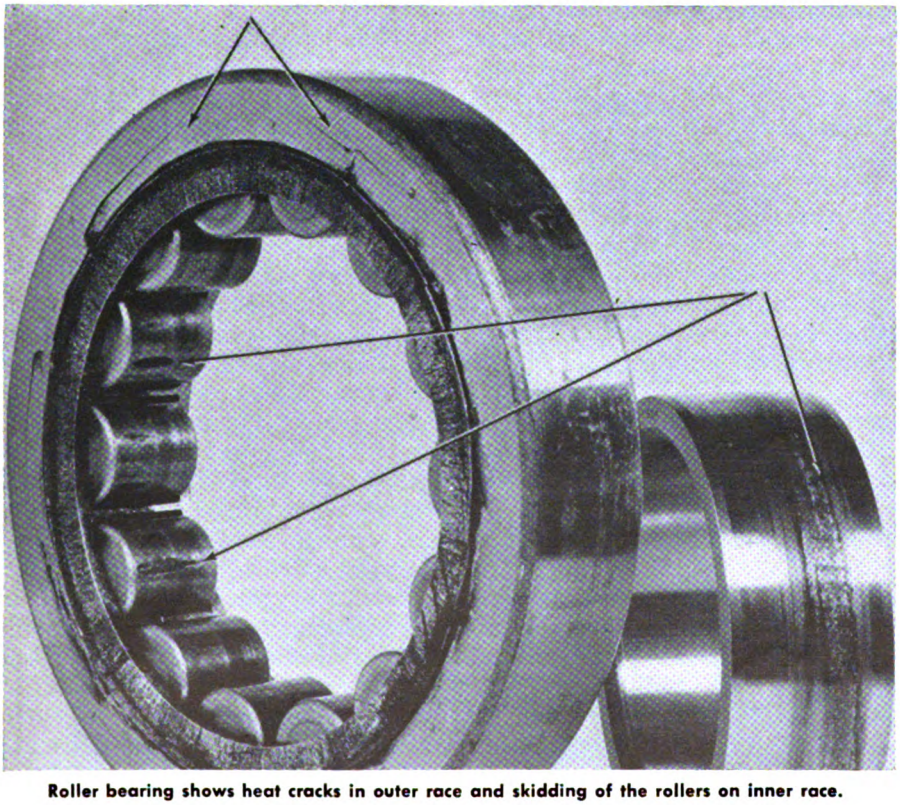
Bearing work should be separated from the regular shop work. This will prevent mishandling of bearings and protect them from the dirt found in open shop areas. A small room, located on the repair floor, can provide a clean working atmosphere.

Many solvents may be used for cleaning bearings and they can be rinsed, soaked, sprayed, or cleaned sonically. Care should be taken to select a solvent which will not attack the bearing itself. Some anti-friction bearings now have non-metallic parts. If you are cleaning any of these, be sure the solvent will not harm them. Do not use solvents that leave a dirty residue and filter all solvents before reuse.

Once cleaned, bearings should be protected from dirt, humidity, and improper handling. This is best done by coating them with light oil and wrapping them in a material that does not absorb moisture. Bearings which can be reused or repaired should be cleaned, wrapped, and stored as soon as possible after removal from the machine.

What should be done with bearings from a machine which has been disassembled for some reason other than bearing trouble? It is most practical to examine the bearings carefully and reuse them whenever possible. In addition to the dollar savings, any bearing that has operated successfully might be preferable to a new bearing which could have unknown flaws.

Some manufacturers mark a series of numbers on the bearing race. When the bearing is reapplied after overhaul, the race can be rotated to put a different number in the load zone. Rotating the race brings a new part into the load zone, giving maximum fatigue life.



Roller bearing shows heat cracks in outer race and skidding of the rollers on inner race.

Anti-Friction Failures

If run to the end of their life, anti-friction bearings will normally fail by fatigue. The trouble usually occurs in one of the races and is identified by little pieces of metal which fall out of the race. As the fatigue failure progresses, large areas of the race fall out and eventually the bearing will destroy itself.

Anti-friction bearings may also fail in other ways, such as by:

Electrical pitting caused by current passing through the bearing. If examined under a magnifying glass, the bearing shows small pits having the appearance of tiny craters. These craters tend to produce early fatigue failure.

Smearing caused by rollers skidding on the races. This tends to produce flat spots so that the parts look as if the rolling element had slid over the surface.

Cracks caused by various conditions, such as flaws in the metal, over-

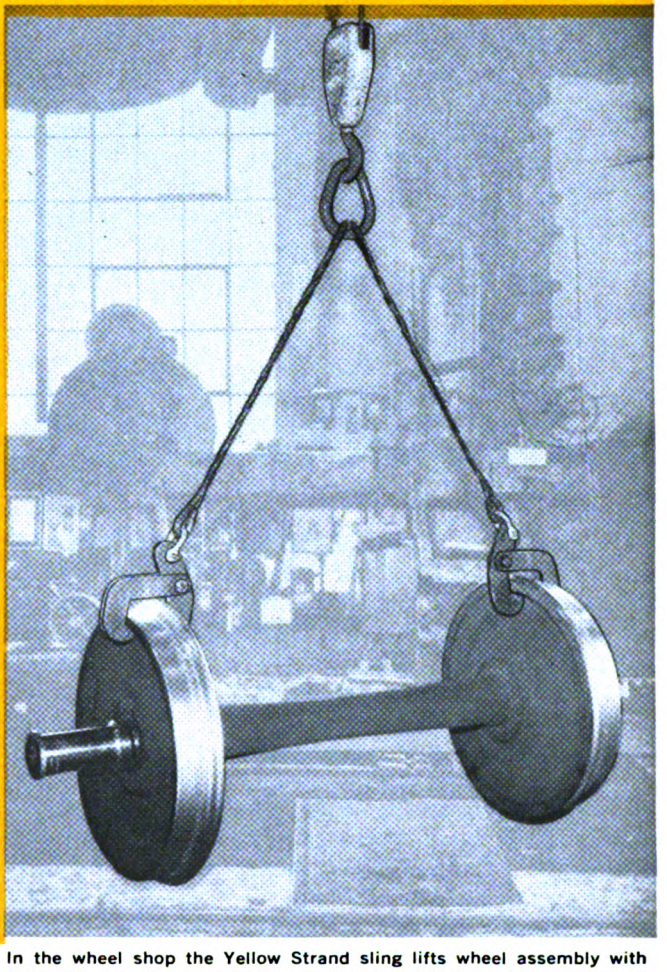
UNIQUE YELLOW STRAND COMBINATION WHEEL SLING MOVES WHEELS OR ASSEMBLIES SWIFTLY, EASILY, SAFELY!



Close-up shows specially designed Yellow Strand hook. It clasps or unclasps easily and cannot slip during lift. Fits all wheels.



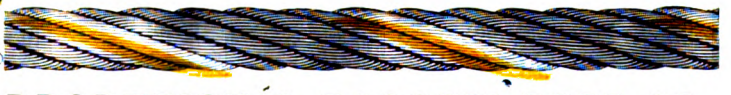
ling in operation in the yard. Only one wheel is shown, but two are arried as easily. Sling holds wheels straight and true making it easy slip wheels on axle.



In the wheel shop the Yellow Strand sling lifts wheel assembly with little effort on the part of the worker. Assembly can be maneuvered quickly and easily. Hooks cannot slip.

Here's another example of the kind of service and satisfaction you can expect when you call on the Yellow Strand sling experts for help or advice. Perhaps this sling can help you do a job better or faster. Perhaps your problem needs a different solution. Whatever that problem may be, depend on Yellow Strand Braided Safety Slings to solve it. Call your Yellow Strand man for full information.

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heating, and too tight a bearing fit.

Preloading resulting in binding of the rolling elements between the races when the bearing is assembled. If the binding is not excessive, it may do no harm. If a temperature difference develops between the inner and outer races during operation, the binding may become excessive. This condition can be identified by wear patterns which will be evident entirely around the circumference of both races.

Misalignment caused by inner and outer races being tilted with respect to one another. It can be identified by a wear pattern in the race crossing from one side to the other.

Staining, not necessarily a sign of trouble, may be caused by chemical action between the grease and the bearing materials. It may also be an indication that the bearing has been running at high temperature. If such is the cause, there will probably be other signs of trouble, such as poor lubrication.

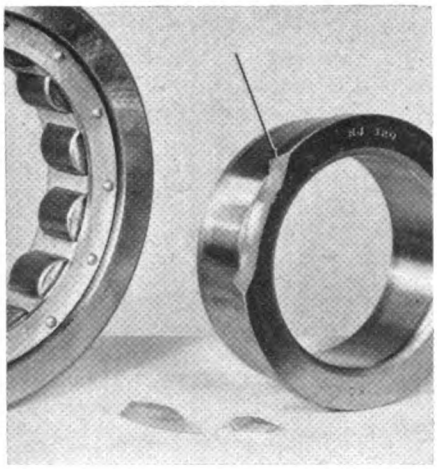
Brinelling, caused by the rolling elements pressing too hard on the races while the bearing is stationary, is identified by indentations in the races having the same spacing as the rolling elements. It is frequently caused by driving the bearing on or off the shaft. Good shop practices and use of proper tools will usually avoid brinelling.

False brinelling. Looks almost like brinelling at first glance, but is more difficult to cure. It is caused by vibration of the machine when it is not rotating. The rolling elements actually wear holes in the races. Two possible cures are to stop the vibration, or to keep the machine rotating at all times.

Slippage of races caused by poor fits in housing or on the shaft. Slipping is bad because it may generate excessive heat. If allowed to continue, it will eventually wear the shaft or housing enough to cause a machine failure. Slipping can usually be identified by scoring marks on the race exteriors.

Dirt indenting caused by a foreign material getting into the bearing. It gives a pox-like appearance to the races, and it will lead to early bearing failures. Proper care in handling and lubricating bearings will go a long way toward keeping foreign material out.

Broken flanges caused by flaws in the bearing, excessive heat, or high thrust loads. A careful study of the failed part will usually give clues as to the cause of the trouble.



Broken inner race, probably caused by flaws in the metal, was discovered during inspection.

Loose rivets on cages caused frequently by excessive vibration, or by skewing of the cage so it carries load.

Worn cages caused usually by improper lubrication. The cage is usually the first component to give evidence of poor lubrication, because it is subjected to sliding rather than rolling action.

Wear caused by poor lubrication. Under some conditions, the bearing is expected to fail by wear rather than by fatigue. A good example is a bearing working in an abrasive atmosphere where the lubricant cannot be kept clean. Failure of pinion end traction motor bearings may be caused by migration of the gear lubricant through the seal into the bearing chamber. Here it contaminates the bearing lubricant and causes wear. This trouble often results from overfilling the gear case.

Sleeve-Bearing Failures

A sleeve bearing usually fails from wear. The journal gradually wears the bearing until it becomes too sloppy on the shaft, or too thin to carry the load. Other causes of failures are:

Scoring, a series of circumferential scratches on the bearing surface caused by a rough journal or by dirt in the bearing.

Loose babbitt, sometimes caused by poor bonding in original manufacture. It may also result from a crack in the babbitt. This allows oil to get into the bond area and build up sufficient hydraulic pressure to break the babbitt away from the backing.

Wiping, which appears in many bearings to some degree, usually takes place when a new bearing is adjusting to the journal. Excessive wiping may indicate inadequate lubrication or a overloaded bearing. Poor journ finish can also cause excessive wipi

Misalignment, identified by wear diagonally opposite edges of the bea ing. It will lead to early failure, b cause the load is highly concentrate

Electrical pitting. Sleeve bearin take on a satin appearance with sm pits when they carry electric curre If excessive, this leads to shorten life.

Overheating, frequently identifi by discoloration of hot areas, is oft caused by localized loading or insuf cient lubrication.

Cracks, often caused by localiz "pinching" of the bearing, or by loa concentrated on point areas. If crac occur, it is well to check the bearin support, because the trouble may b there.

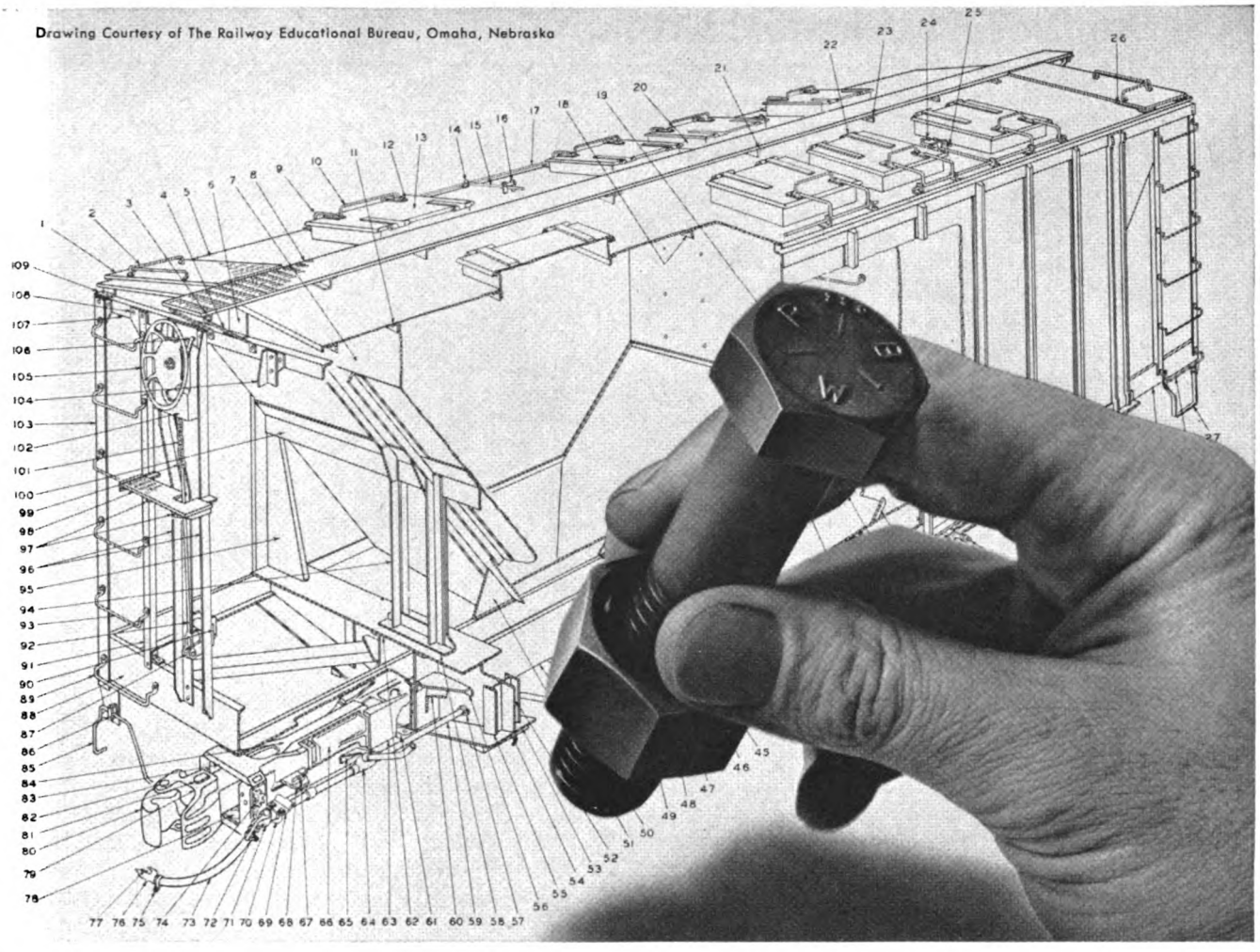
What About Salvage?

Babbitted sleeve bearings can be r babbitted when worn out. The met in unbabbitted bearings has a salva value. Many vendors allow credit f the return of worn sleeve bearings.

The case for anti-friction bearin is different. Some cost so little that is cheaper to replace them than to a tempt salvage. Others cost so muc that they are well worth salvaging possible. Some manufacturers w take bearings which have min troubles and recondition them. Su reconditioned bearings are consider as good as new, and this service off definite economies.

Doubtful bearings should not be used. The money saved will seldo warrant the risk of an equipment fa ure. How many times and how lo a bearing can be used it is difficul say. Any answer must be based on perience with the equipment. T experience can be of benefit only adequate records are kept. The da and cause of each failure should recorded. Such records may sho that a particular trouble is being e perienced, or that certain machin are giving trouble. This informatio helps solve the problems quickly, s saving untold cost. If the same trou is occurring repeatedly, it may be w to consult the manufacturers. The experience on other applications m lead to quick solutions.

In conclusion, the keys to keep bearing troubles under control regular and systematic checks, car observations, and accurate records



Where would you use high strength bolts to construct a permanently-tight hopper car?

Wherever you have a problem joint —wherever shock, vibration and impact under high loads so often cause rivets to loosen or fail—that's where RB&W High Strength Bolts belong.

Unlike rivets, high strength bolts stay tight, exert over twice as much force on a joint. In fact, clamping strength is so great that the resultant frictional force between bolted members—not just the shear strength of the fastener as with a rivet—helps keep the joint from failing under rough service.

RB&W's High Strength Bolts are easy to install in new cars or cars being rebuilt, particularly where quarters are cramped. Instead of four-man riveting crews, two men—sometimes only one—can do the job. This reduces assembly costs. Saves time and money on future maintenance, too; keeps rolling stock in service longer, instead of being returned to the shop for repairs.

When rivets fail, trouble begins. Save yourself needless costs by calling in an RB&W engineer to show you exactly where to use high strength bolts in a hopper car...or any other freight car, for that matter. Bulletin RR-3 tells more. Write Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.

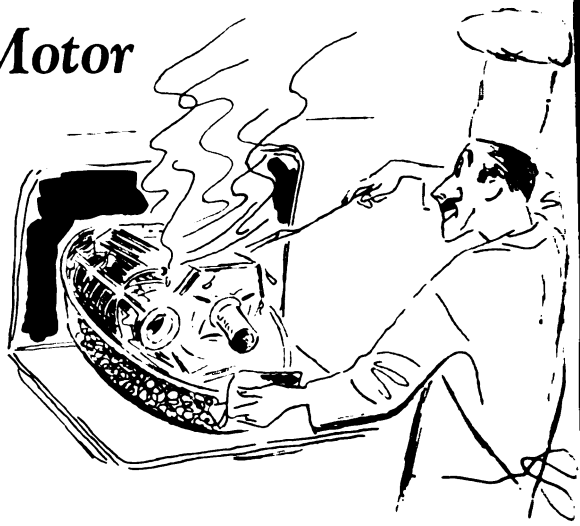


Plants at: Port Chester, N. Y.; Corapolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

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117th year

Recipe for Roast Traction Motor



By Gordon Taylor

"Doc" Watts, the electrical foreman, was walking through the Centerville diesel shop when he was stopped by Fred Newman, an apprentice. "Mr. Watts," Fred said, "I have a question that's been bothering me. If you have the time, I'd like some information."

"What's your trouble?" asked Doc.

"Cable connections on traction motors," Fred answered. "We were putting a new truck under unit 1240. The man I was helping said we must be sure to check the rotation of each motor under power to be certain it operated properly in both directions. I then asked him why, if it worked OK in one direction, wouldn't it also work OK in the opposite direction when the reverser was thrown.

"He told me that, if certain cables were connected, the motor might rotate properly in one direction, but wouldn't operate properly in the opposite direction. He didn't make it clear to me what these wrong connections would be and didn't show me just what interfered with proper motor operation. I'd sure appreciate it if you would straighten me out."

"I'll be glad to explain," said Doc. "First, let's consider what gives a motor the ability to develop power. Rotation of a motor is due to the reaction between the current flowing in the armature coils and a magnetic field in which the armature coils rotate. The motor's torque or turning power is proportional to the current in the armature times the field strength. There must be a proper armature circuit and a proper field circuit before the motor will work. Field and armature circuits of traction motors are connected in series. By changing the direction of current flow in the fields, we change the direction of rotation. It would do no good to change the flow of current through both the field and armature circuits. To change the direction of rotation, we must change the relation between the field set up by the armature coils and the field set up by the field coils.

We must reverse the flow of current through the field coils when we want to reverse the rotation of a motor. Interchanging a motor's field and armature cable connections could make the motor operate correctly in one direction but not in the other.

"If you will check the wiring diagram for one of these units, you'll find that throwing the reverser can cut the motor field out of the circuit *if* a field and an armature lead had been interchanged. The motor could then operate correctly in one direction but not in the other. If a unit were put into service without checking rotation of individual motors, the condition might continue for some time before being detected. In that case, you'd probably have a badly damaged motor."

"What," asked Fred, "would damage the motor? If it wouldn't work properly in one direction, then it surely wouldn't be overloaded when the unit was operating that way."

"Good question," said Doc, "I'll be glad to clear it up for you. Motor heating depends on the current flowing through it. Heating effect rises rapidly when current goes up. Heat increases as the square of the current. If you double the amperes, the heating effect is not doubled but increased by four times (two times two). Consequently, current flow must be limited to a value which will allow motor temperature to be controlled by the ventilation provided by the traction motor blower.

"Fortunately, traction motors have what you might call a 'built-in' safety feature that limits current when all circuit connections are proper. This is the counter emf, or counter voltage, generated by the motor. At the last meeting of the apprentice class, we found that counter voltage is generated when any conductor cuts magnetic flux. This is just as true of the conductors of an armature when it is running in a motor as when it is operating in a generator. In both cases, the armature conductors are rotating in, or cutting through, a magnetic field.

"The conductor voltage induced in a motor armature is in a direction opposed to, but always less than, the voltage applied to the motor. And a motor tries to protect itself from excess current by generating a counter voltage.

"Let's consider a traction motor that has had the field and armature leads interchanged. When the reverser moves to the position that cuts the motor field circuit, it still maintains a circuit through the armature. This places the armature in the circuit from the main generator, but the only excitation is that resulting from a weak residual field in the field poles. This leaves the armature helpless to operate as a motor armature should and is incapable of generating a counter voltage that would limit the current from the generator. The only limit to current flow through the armature would

(Continued on page 43)

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.



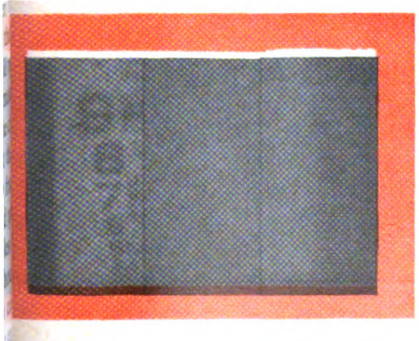
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TUFF FAST-DRY ENAMEL provides three important advantages over present coatings: It goes on faster. Looks better. Stands up longer. Designed for metal or wood, TUFF Fast-Dry Enamel is ideal for coating or re-coating diesels, cars, track and signal equipment, bridges and buildings.



IGH GLOSS. *Initial gloss superiority of* TUFF *ast-Dry Enamel (left panel) is shown in is Kerr Definometer Reflectance test. Middle anel is coated with a well-known enamel, ght panel with a leading lacquer.*

TUFF EPOXY SYSTEM
Major breakthrough in chemical-resistant coatings.

Everybody knows epoxy paints have good chemical resistance . . . but they chalk and lose gloss and color. Now Freight Liner introduces an epoxy system that accents the positive . . . *eliminates the negative.* New TUFF Epoxy retains its glass-like gloss, bright, crisp color, while providing maximum resistance to chemical spillage and atmospheric corrosion.

TUFF gives 800 square feet coverage per gallon, more than that of leading competitive epoxy systems. Mixing and using TUFF is easer, too, thanks to tolerant component ratios (1:1 or 2:1) and long pot life (16-48 hours). Painters say TUFF Epoxy is as easy to apply as conventional one-component paint.

Both of these new TUFF coatings are available as complete systems with rust inhibitive primers. For samples and technical literature, write H. B. FINCH, MANAGER, Freight Liner Products.

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Bangor & Aroostook Conversion...

Passenger Diesel Now Hauls Freight

What has been called the first successful conversion of an EMD road passenger locomotive for freight service by a U.S. railroad has been completed at the Northern Maine Junction shop of the Bangor & Aroostook. Locomotive 10, a 2,000-hp EA-7 purchased in 1949, was altered so that its performance is compatible with that of the F-3 road freight units of the BAR. All work was done by the railroad with engineers from the Electro-Motive of General Motors as consultants.

The BAR claims this to be "the biggest bargain of the year." It has acquired, the road says, the equivalent of a $200,000 unit. "We were able to convert a locomotive," W. J. Strout, executive vice-president said, "that might have been worth $18,000 to $20,000 on a trade toward a new $200,000 freight locomotive, for under $10,000. Our one remaining passenger locomotive will be converted as soon as possible."

Two years ago Railway Locomotives and Cars surveyed 34 roads operating 2,000-hp, 2,250-hp, and 2,400-hp road passenger locomotives, asking what could be done with these big locomotives if there was no passenger trains for them to haul. This survey (RL&C, September 1959, p 44) indicated that 13 roads would assign the units to freight service in their original condition; four would do it only if gear ratios could be changed, and seven said that they would not be used in freight service.

Problems

The problems involved were:

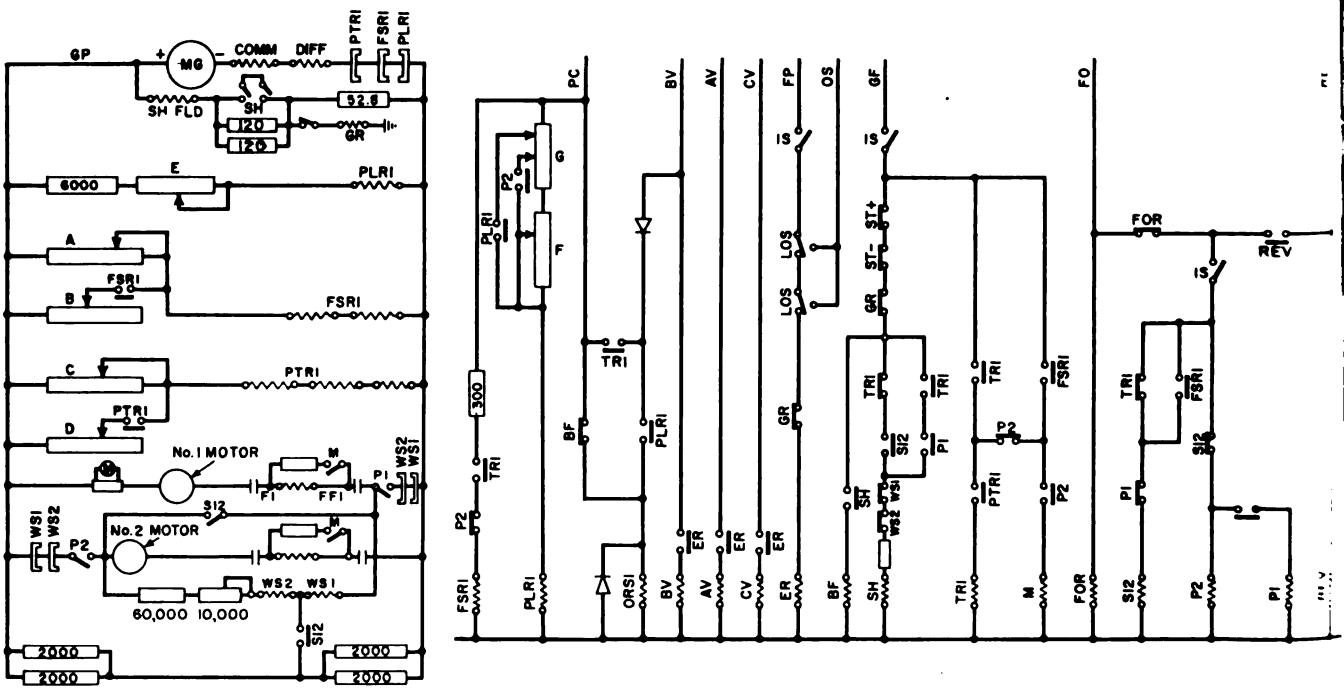
- High horsepower rating per driving axle;
- Sacrifice of adhesive weight because of the two idler axles;
- Continuous rating at speeds higher than practicable for freight service;
- Impossibility of re-gearing to drop continuous speed into range of many road freight units;
- Absence of automatic backward transition on some units.

"To put the continuous rating into the range where passenger units could be utilized effectively in freight service without new trucks and additional motors is difficult," the article continued. "Here the EMD units pre special problems. While 40-in. dri wheels have been standard on Al Baldwin, and Fairbanks-Morse p senger locomotives, all Electro-M tive E-type units have 36-in. wh This limits the size of driving which can be applied."

About the time this article appe the BAR began to concentrate on conversion problem. Passenger lo had forced curtailment of train ser so that one of its two expensive p senger units was not being utilized cept as work train motive power. ing two or three months of the ye

"What we wanted," said Mr. Str "was to convert this engine for around freight service so that it co be used interchangeably with the of our motive power. We were that the conversion had never b successfully made and that the couldn't be used with conventio freight locomotives in multiple-u operation."

Mr. Strout, together with Mecha cal Superintendent V. L. Ladd, ta with other railroads that had sur



Control conversion for the transmission for one of the two 1,000-hp engines on an E7 includes power limit and EI transition. Variable resistor values and settings are as follows: A—15,000 ohm, 0.078 amp at 980 volts; B—20,000 ohm, 0.088 amp at 670 volts; C—20,000 ohm, 0.063 amp at 980 volts; D—10,000 ohm, 0.085 amp at 450 volts. E—6,000 ohm, 0.129 amp at 980 volts; F—1,500 ohm, 0.033 amp at volts; G—1,500 ohm, 0.090 amp through P2 interlock at 74 volts 0.0150 amp through PLRI interlock at 74 volts.

units and then to engineers at EMD ıere the locomotives had been built. me roads were scrapping their pas-ıger units; others were trading them on new freight locomotives.

In April 1961 the decision was ıde to attempt the conversion of ›comotive 10 despite advice of ıers who had tried it. At Mr. Strout's ıuest, EMD sent a team of engi-ers to the Northern Maine Junction ıere the work was scheduled to be ›ne.

The basic problem in the conver-›n is that a passenger locomotive has ntinuous and maximum speeds gher than those of freight units. This oblem was solved by changing the ar ratio from the original 57/20 to 2/15 which corresponds to that of AR freight power. This made it :cessary to install larger wheels on the locomotive. Increasing wheel diameter from 36 to 38 in. gave sufficient over-the-rail clearance for the 62-tooth gears. The 40-in. wheels, standard on freight units, could not be used because they made too great a change in locomotive height. All wheels, including those on the center idler axles were changed. Truck brake rods were lengthened to compensate for the change in wheel size and the coupler height was adjusted to compensate for the change in truck height. The steam generator, no longer needed, was removed, and the unit was ballasted to compensate for the material removed. Cab heaters were repiped so that, instead of steam, they used cooling water from the No. 1 engine.

The electrical controls were modified to give automatic voltage—current transition down to 10 mph instead of 19 mph. Engine output is controlled by the transition relay hook-up and the load regulator. Output is regulated so that it is in the 1,500-hp range at speeds up to 25 mph. Above that speed, the output is allowed to rise to the locomotive's rated 2,000 hp.

On July 11, the locomotive made its first trip in freight service. EMD engineers rode the unit along with BAR mechanical officers. They found the converted locomotive an unqualified success. It proved to be fully compatible with BAR freight units.

On September 2, the BAR ceased all of its rail passenger service and shortly thereafter announced its plans for conversion of Locomotive 11, so it can take its place in the regular road freight locomotive pool along with Locomotive 10.

:oast Traction Motor

(Continued from page 40)

ɜ resistance of the armature coils. he resistance is so very low that this ṁature would form practically a ıort circuit across the power circuits. xcessively high current through the ṁature would damage it, giving us thoroughly roasted traction motor. ou must always remember how im-ortant it is to check traction motor ›tation in *both directions* any time ıotor leads are being connected."

"What's a quick, reliable method ›r doing it?" asked Fred.

"I'm sure you have observed the ıree-point suspension of traction ıotors in trucks," Doc replied. "Two ›oints are the two axle suspension ·earings and the third is the nose sus-ɔnsion. Each time power is applied ɔ the traction motors, the pinion of ach motor tries to ride around the xle driving gear, raising the motor up ›r pulling it down, depending on its otation. Movement of the motor is ırrested by the nose suspension—hose heavy lugs on the motor frame hat contact the top and bottom of a ıest of springs fastened to the truck rame bolster.

"To check the direction of motor ·otation, observe the movement of the ıose suspension when power is ap-›lied. A motor which is connected ›ackwards can be readily detected. Remember to check each motor with he reverser set for *both* directions of travel. Checking the rotation in just one direction does not give you the complete story.

"Direction of motor rotation on passenger-type locomotives may be easily checked by operating one power plant at a time, applying power to the truck to be tested. If one of these two motors is connected wrong, the locomotive will not move. This same method may be used on switcher locomotives by isolating one truck at a time, using the motor cut-out switch for that purpose.

"There is another special situation which we should consider. Suppose the individual axles do not revolve in the same direction for a given position of the reverse lever, even though it is evident that all motors do develop power in both directions. This indicates that field *or* armature leads of one of the motors are reversed and differ from the first case in which field and armature leads were interchanged.

"To correct this trouble, be sure that the change is made at the correct point; don't reverse the armature leads when the field leads should have been changed or vice versa. Reversing the wrong leads may correct the immediate difficulty, but not cure the trouble permanently. It would also make the wiring different from the diagram, leading to more difficulties. You should check the wiring diagram for that locomotive and only then change the leads.

"Remember that when a motor operates a unit correctly in one direction, although drawing excessive current, it has an armature and a field lead interchanged," concluded Doc.

"Did you ever have a case where a traction motor was ruined by being put in service with interchanged field and armature leads?" asked Fred.

"Never on a unit dispatched from this shop," said Doc proudly. "We did have a case several years ago. A unit came in from one of the smaller points with such a motor. The shop there installed its spare truck on the unit. Everyone was hurrying to release the locomotive. An acting foreman, in charge of the work, was not accustomed to the pressure that prevails at such at time. He yielded to the criticism of the yardmaster who was trying to speed the train's departure. The foreman knew that both motors should be tested for rotation in both directions, but when the last motor was connected and operated properly in one direction, he said, 'Take it; it's OK.' By the time that unit reached us here at Centerville, that motor was as hot as Custer's pistol. We had roasted traction motor on our menu for that day. It's a dish that you never acquire a taste for. It was a bad dish for that foreman. Having demonstrated that he would weaken under pressure and could endanger expensive equipment, it was two or three years before he again had the opportunity to demonstrate that he could supervise at one of our shops."

Journal Problems

(Continued from page 20)

porting methods in order that a definite cost analysis might be developed.

Lubrication periods on roller bearings have been extended from 18 months to 24 and 36 months, depending on the type of bearing. A large number of cars now on test seem to indicate further extensions will be possible.

The stabilized solid journal assembly and sealed journal box comprise the simplest method for achieving a four-year repack period, the Committee reported. The arrangement also offers an opportunity to reduce the number of servicing points and to reduce consumption of oil, journal bearings, and lubricating devices.

There are a number of rear seals available, but their effectiveness depends on controlled axle movement. The two generally accepted methods for controlling axle movement are journal stops and flat-back bearings. Both have proved that they will perform satisfactorily.

Several low-cost stops are now on test, but results are not conclusive. According to the Committee, journal stops which have been in service for a number of years have proved their effectiveness in protecting the rear seal, prolonging journal bearing life, and providing better performance.

The flat-back bearing is easier to install than most journal stops. The special wedge which it requires can now be purchased for less than the standard wedge. A number of cars with flat-back bearings and front and rear seals have been on test for over three years, and the results have been excellent.

While many railroads were slow to apply lubricating devices, they are now moving rather rapidly to take advantage of the economies which are possible. In 1960, many servicing points were eliminated and roads now operate trains from 400 to 1,200 miles without inspecting the journal boxes. A large number of roads now use seasonal oil to facilitate wicking in winter because wicking characteristics of lubricating devices decrease as the temperature drops. Many are also using premium or additive journal box oils which are reported to have a much greater load carrying ability, lower friction characteristic, greater protection under marginal conditions, and better rust inhibiting qualities.

While it is difficult to assemble enough field data to produce agreement as to the value of these oils, many roads with system car mileage constituting a substantial portion of their total car-miles say these oils have proved themselves.

The AAR requirement of adding sufficient oil to bring the level up to ½ in. in the journal box is producing good results. When all journal boxes are equipped with seals, automated hump oiling systems will probably replace the can method.

A major cause for improper functioning of a lubricating device is moisture, the Committee said. Water in journal boxes is one of the chief causes of hot boxes; it also shortens the life of lubricating devices. It is most serious on tank and refrigerator cars. In many cases, cars with wate boxes are taken to the shop tracks w they receive the same attention as if be repacked according to Rule 66, bu charge is allowed for this work. It was posed that the AAR consider an add to Rule 66 allowing repacking of tank refrigerator cars on a 6, 12, and 18 mo basis, with the delivering or handling sharing the cost with the car owner.

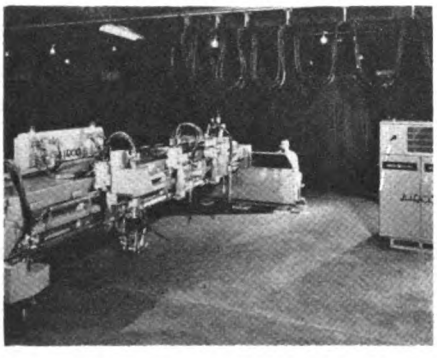
Center Plate Lubrication

Irregularities between center-plate f result in small contact areas with high l which restrict proper swiveling of freig car trucks. This condition results in une journal loading and causes flange we Lubrication has been ineffective, beca the lubricant was forced out or solidi

Experiments with various lubricants h not met with complete success. Machi center-plate surfaces and applying mo bdenum disulphide powder with an evapo ting agent, or in the form of molded pla discs, initially gave encouraging results. molybdenum disulphide did not last long, but did produce a better surface co tion for ordinary lubricants. Tests are being conducted with hardened metal d separating the softer center plate surfa Some of these discs have holes in them retain the lubricant. If tests do not y satisfactory results, some thought will pr ably be given to redesigning the center pl ing so it will retain the lubricant, or to use of smooth plastic materials on th wear surfaces.

What's New

(Continued from page 10)



the drawings is transferred to paper tape by means of an automatic punch typewriter. The tape provides the input data to the cutting machine. After initial positioning by an operator, all operations are fully automatic. Auxiliary functions, such as starting and stopping the machine, igniting of preheat flames, flame control, gas supply control and cut sequence, are also programed on the tape. Cutting speeds, also controlled by the tape, can be programed within the limits of 2 ipm to 35 ipm. A fast traverse speed for positioning the machine between cuts may be programed on the tape up to 150 ipm. The unit has four cutting torches with an accuracy of (plus or minus) 1/64 in. *Air Reduction Sales Co., a division of Air Reduction Co., Dept. RLC, 150 E. 42nd st., New York 17, N.Y.*

All-Steel Center Flow Car

An all-steel version of the Center Flow high-capacity covered hopper, the tubular body of which serves as the center sill (RL&C, June 1961, p 33), is now being built and sold to the railroads by ACF and leased to industrial users by ACF's Shippers Car Line Division. Aluminum cars are also in production. Center line placement of loading hatches and unloading gates speeds the flow of lading in and out of the Center Flow car, and its four inverted-pear shape compartments permit more than one commodity at a time to be shipped. *American Car & Foundry Div., ACF Industries, Inc., Dept. RLC, 750 Third ave., New York 17.*

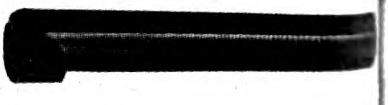
Stop-Check Valve

The low pressure drop of the special locomotive stop-check valve for installation on the outlets of heating boilers in diesel locomotives is said to provide efficient and uniform heating in all passenger trains. The valve is a combination shut-off and check valve that can be closed remotely by air pressure or manually by a T-handle. A spring keeps the valve steam and diaphragm retracted to allow the disc freedom of travel under normal operating conditions. Body and stanchion are cast steel; seat ring, main valve, gland, gland bolt and nut stem and spindle, stainless steel; seat and disc. Stellite-faced steel. Inlet and union outlet have female pipe taps. *Atlas Valve Co., Dept. RLC, 280 South st., Newark 5, N. J.*



Rubber Base Sealers

The cross-sectional "double donut" des of the hollow EC-2121 sealer (left) and EC-2131 solid sealer (right) is said to p mit positive sealing of uneven or tape joints, and 90-deg bending without cutt or fitting operations. Light hand press seals mating metal surfaces. *Minnes Mining & Manufacturing Co., Dept. RL 900 Bush ave., St. Paul, Minn.*



Boring Bars

The five small boring bars in the BB- series have the same diameters but shorter in length than the series BB- K-bars. The BB-7500's are primarily jig boring machines and similar appl tions where utmost rigidity is required close tolerance boring and best poss finish. Bar diameters are 3/8, ½, 5/8 and 1 in., with respective lengths of 4 6, 7, and 9 in. for the new series. *Ke metal Inc., Dept. RLC, Latrobe, Pa.*

CHECK √ DIESEL ENGINE WEAR

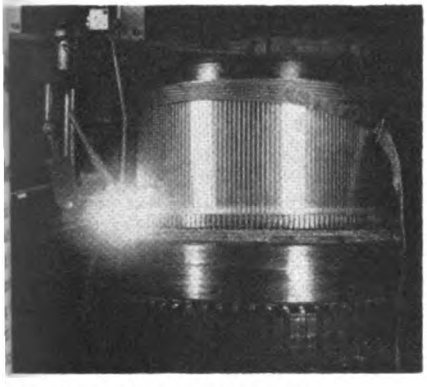


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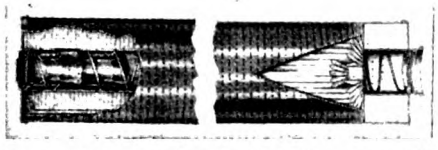


raction Motor Repair

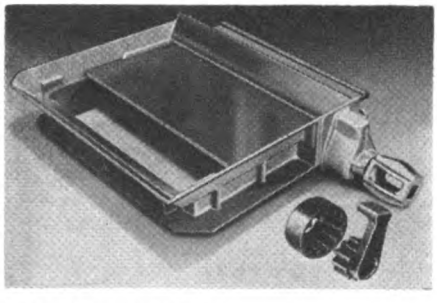
liability of rebuilt traction motors for avy diesel-electric locomotives is said to increased through the use of Tungsten ert Gas arc welding. This is a semi-automatic spot welding method which uses ngsten for the electrode and inert gas to eld the molten weld puddle from atmospheric contamination. Used on traction otor commutators, it fuses copper to copper, yielding a strong, ductile joint, according to GE's Service Shops Department. ldering is eliminated. *General Electric ., Dept. RLC, Schenectady 5, N.Y.*

aper Filter Cartridge

e pleated filter paper in the CP3 filter tridge for diesel locomotives is corrued. It is held in position to outer shell

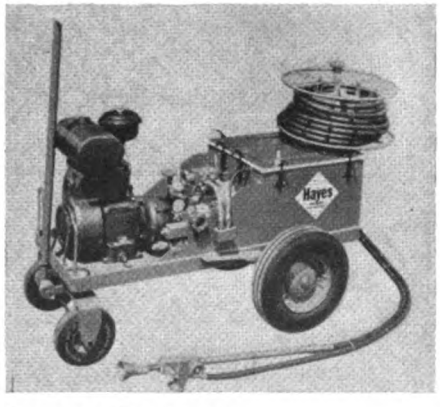


by specially developed adhesive to provide positive filtration with high flow. End caps are of 26-gage tin plate. An expanded 12-gage steel reinforcing spring is enclosed in the center plate of 28-gage cold-rolled steel. Hycar Spacer is at top of filter. Full-flow cageless or canister types are available in 5½- and 6½-in. diameters. *Superior Diesel Filter Co., Dept. RLC, 200 S. Michigan ave., Chicago 4.*



Discharge Gate

Rack-and-pinion operation of the "Power-Geared" discharge gate for covered hopper cars is centered around a hypo-cyclic gear combined with an anchored pinion, free to follow the eccentric crankshaft path but not free to rotate itself. This 6:1 reduction ratio enables an average man with a 5-ft bar to exert 19,000 lb of opening power at the power-geared gate, compared to 6,500 lb at a direct-drive gate. *Wine Railway Appliances, Division of Unitcast Corp., 2237 Water Works Drive, Toledo 9, Ohio.*



Power Sprayer

Cleaning of cars, locomotives, repair shops, or pits, it is said, is fast and efficient with the portable Hayes Je t 500 heavy-duty power sprayer, using only cold water with detergents and cleaning compounds of any type, liquid or soluble. Only one man is needed for operation of the sprayer which applies 10 gal of mixed spray material per



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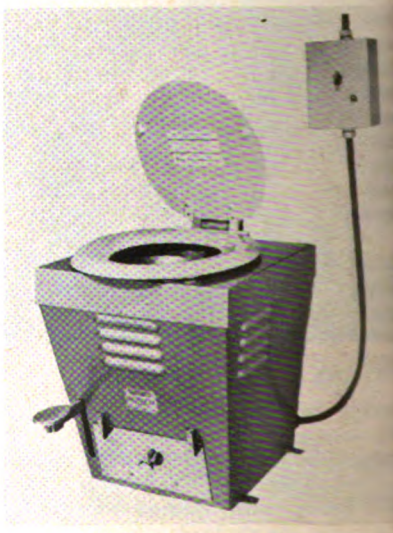
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min at gage pressure of 500 lb psi, or 6 at 200 psi. It is capable of delivering gal of spray solution with each full ing of the 12-gal concentrate tank, or be used to spray as little as 50 gal. gasoline engine is a 7-hp, 4-piston pu type. It weighs approximately 425 *Hayes Spray Gun Co., Dept. RLC, Pa dena, Calif.*



Trailer Bridge Plate

Lightweight aluminum bridge plates now available for piggyback cars. The n design weighs 85 lb as compared with 160-lb weight of the conventional mode The welded aluminum assemblies are d able, do not rust, and will support all leg truck-trailer loads. One type has an abr sive treadplate surface. Another type whi has performed satisfactorily for two ye has a diamond treadplate surface. A *minum Co. of America, Dept RLC, 15 Alcoa Building, Pittsburgh 19.*



Electric Toilet

Waste is reduced to inorganic ash in a m ter of minutes with the Incinolet, an el trically operated toilet which has been su cessfully installed on diesel locomotive Candor, a built-in, heat-activiated catal is used to stop odors. The unit is also su able for work cars, trailer houses, and is lated work areas where water-flush syste freeze, or are difficult and expensive to i stall. *Research Products Manufacturi Co., Dept. RLC, Box 35614, Dallas 35, Te*

ıpply Trade Notes



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ACF



Henry F. Dreyer
Humble Oil



W. H. Schomburg, Jr.
Dana

ıERICAN CAR & FOUNDRY DIV., CF INDUSTRIES, INC.—*Thomas C. Ballou,* w York district sales manager, appointed ınager of railway equipment sales. *Robert Curtis* appointed sales representative, Louis district, succeeding *Walter H. gue,* resigned.

■

ıERICAN STEEL FOUNDRIES. — *ılter Moryto* appointed mechanical astant to the vice-president, Transportation uipment Division. Mr. Moryto will conue also as manager of division's service gineering section. *Raymond C. Howell* pointed chief works engineer, Transportan Equipment Division. *J. Herbert Lund* med manager of railway sales, Hammond ˈision.

■

ANA CORP.—*W. H. Schomburg, Jr.,* astant general sales manager, appointed neral sales manager. *John P. Henson,* es manager, Universal Joint division, apinted assistant general sales manager.

■

ıPOR HEATING CORP.—Stockholders Vapor Heating Corp. have approved a ange in company's name to Vapor Corp.

■

UMBLE OIL & REFINING CO.—*Henry Dreyer,* engineer, named manager of railad sales, Esso Standard Region.

■

)URNAPAK CORP. — *Magnus Metal ›rp.* appointed national distributor in the S. *T-Z Railway Equipment Co.* will conıue to handle selected accounts for Jourpak.

■

IR REDUCTION SALES CO. — *L. J. acLennan, Jr.,* appointed assistant maner of distributor sales, midwestern region. r. MacLennan formerly assistant manager distributor sales, Pittsburgh district.



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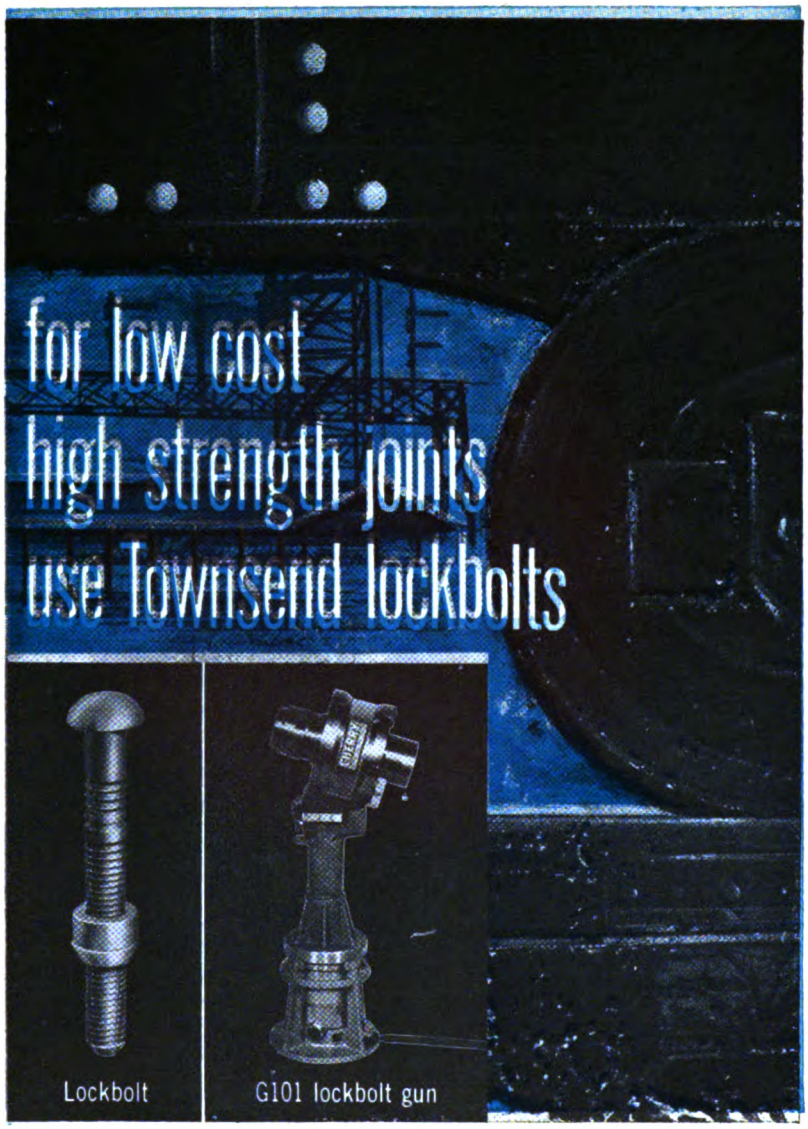
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■

SHELL OIL CO.—*Warren C. Landi* pointed manager of railroad sales, N York, succeeding *William B. Garthey*, will assist Mr. Landis during a transiti period before assuming another posi with the company. Mr. Landis was form industrial products manager at Baltim Md.

■

BUDD CO. — A dynamometer, using electronic analog control and feedback s tem, has been developed and installed the Budd Railway Division exclusively railway brake research and quality cont The machine is said to be capable of si lating the most frequent starts and st and severest grades encountered by mainline passenger, freight, commuter, rapid transit train.

■

GENERAL ELECTRIC CO. — GE build a multi-million-dollar Appara Service Shop at Cleveland to handle ov haul and repair of locomotives, steam t bines and generators, transformers and dustrial motors of all sizes. The 110,0 sq ft facility will include an inside-the-bu ing railroad siding, 600-ton hydraulic pr 30,000-lb precision balancing machine, one to 100-ton overhead crane coverage.

■

STONE FILTER CO. — *Obey N. Ev meyer* appointed director of sales.

■

SPARTON RAILWAY EQUIPME DIVISION OF SPARTON CORP.—*Robert Passani* and *Dan Call* appointed eas representatives. Mr. Passani will co northeastern states from 500 Fifth av New York; Mr. Call, southeastern st from 8913 Brieryle ave., Richmond, Va

■

MOTOR COILS MANUFACTURI CO.—*Walter F. Fauerbach* appointed vi president, sales.

OBITUARY

DAVID R. VOGEL, 47, district sa manager, Morrison Railway Supply Co died Sept. 10 at his home in South Ho Ill.

Letter to the Edito

Traction Gear Wear

TO THE EDITOR:

Mr. Taylor's article, "Doc Disc Effects of Traction Gear Wear in the M issue of Railway Locomotives is the sec I have noticed on this frequently neglec yet critical and little understood, subje

Congratulations to Mr. Taylor on skillful presentation in a uniquely inter ing and easily understood manner of w could be a difficult subject for your read

J. W. Teker
Manager, Engine Mfg. Engr Operations, Locomotive & Equipment Dept., General Elec tric Co.

ELPS FROM ANUFACTURERS

ATHES. 8-page Bulletin 1218 describes atures and construction of new Farrel-tts heavy-duty 3-way bed lathes which nge in capacities from 32 to 92 in. swing. cludes complete machine specifications. Vrite: *Farrel-Birmingham Co., Consolited Machine Tool Div.*, 565 Blossom oad, Rochester 10, N.Y.)

■

EAM-DETERGENT CLEANING. low to Get the Most out of Steam Clean-g with Oakite Specialized Detergents" ts six essential properties which deter-nts used in steam cleaning should have. ves technical specifications of the Hur-lean steam-detergent gun and the Steam stol and a descriptive outline of materials w used in steam-detergent cleaning. Vrite: *Oakite Products, Inc.*, 119 Rector , New York 6.)

■

RAINING FILM. 16 mm. color-and-und motion picture, "How to Weld USS -1' Steel," shows and explains importance using right electrodes, right heat, and ht procedures to insure sound welds in s constructional alloy steel. For group owings. Running time, 18 min. (Write: *S. Steel Corp.*, Dept. RLC, Room 6363, 5 William Penn Place, Pittsburgh 30, Pa.)

STEAM GENERATORS. Clayton steam generators for heating, for general shop service, for preheating cars, and for over-the-road service on diesel locomotives described in attractive "Transportation-Railroads" booklet. (Write: *Clayton Manufacturing Co.*, Dept. RLC, El Monte, Calif.)

■

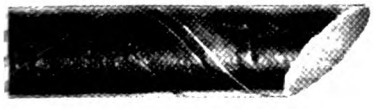
ALL-PURPOSE CLEANER. Bulletin F-2834 on Aerowash liquid all-purpose cleaner gives directions for brush cleaning or automatic machine cleaning of diesel locomotive and passenger car exteriors, as well as brush or steam cleaning of interiors of locomotives and passenger, baggage and mail cars. (Write: *J. B. Ford Div., Wyandotte Chemicals Corp.*, Dept. RLC, Wyandotte, Mich.)

■

V-BAND COUPLINGS. 16-page booklet, (SDP-2), "Economics of the V-Band Coupling," gives specific cost comparisons between V-bands and other joining methods. (Write: *Marman Div., Aeroquip Corp.*, 11214 Exposition Blvd., Los Angeles, Calif.)

■

INDUSTRIAL FASTENERS. "Lebanon Plant Fasteners," Booklet 556, tells the story of Bethlehem Steel's Lebanon, Pa., plant and the fasteners made there. Booklet opens with a history of the plant; describes its manufacturing facilities, and details many of its products and processes. (Write: *Bethlehem Steel Co.*, Dept. RLC, Bethlehem, Pa.)



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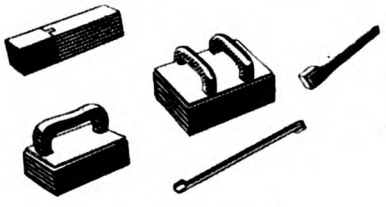
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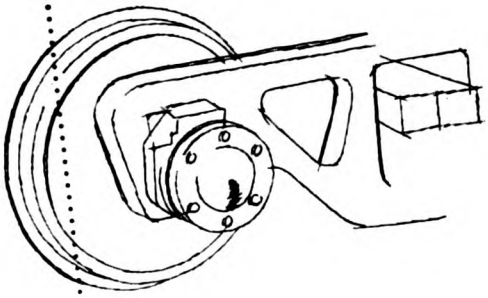
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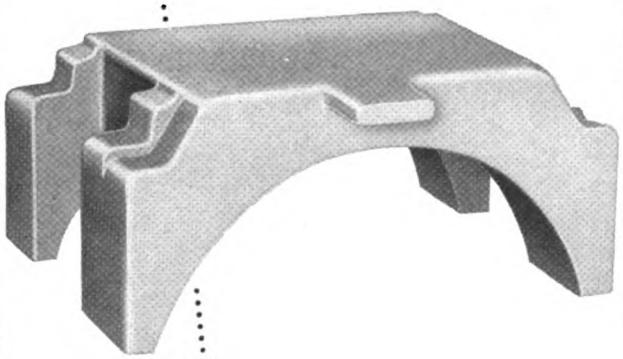
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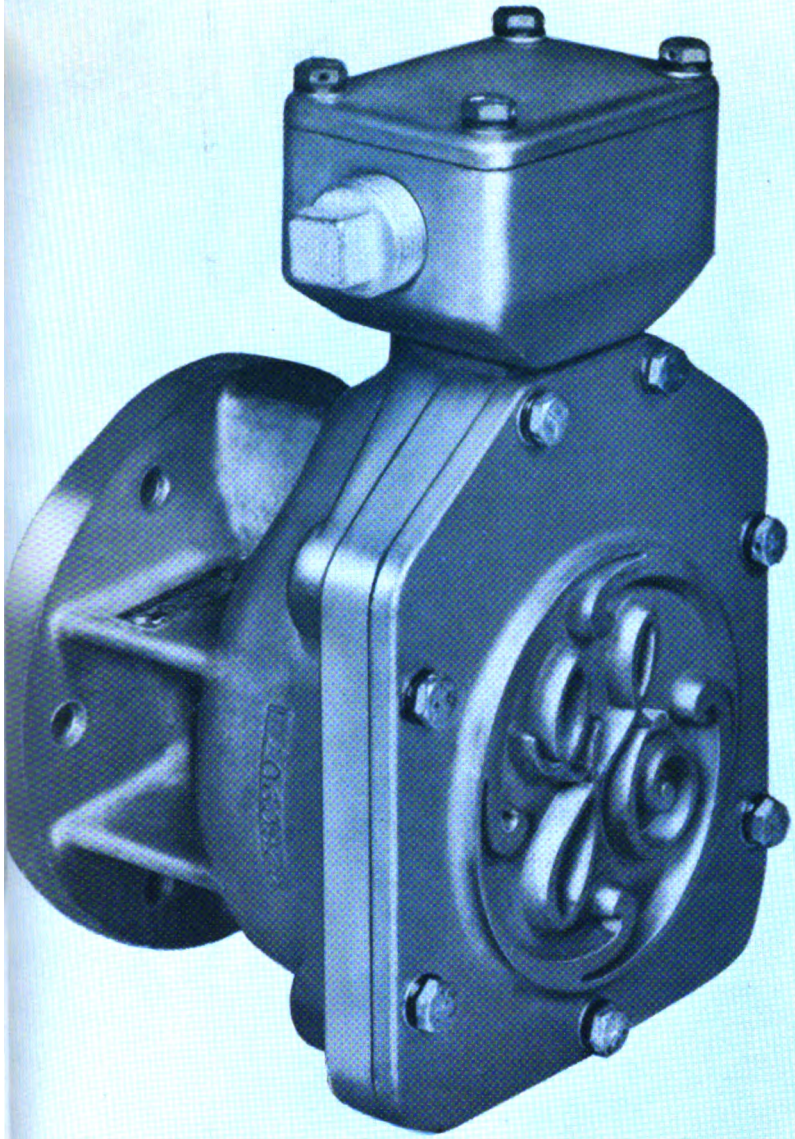
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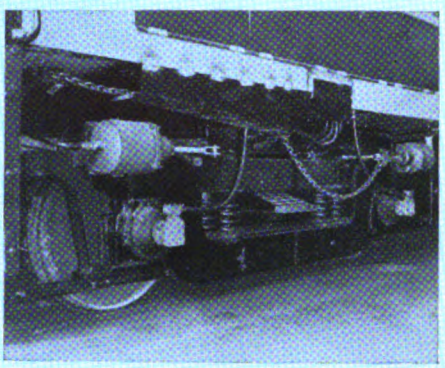
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General Motors Introduces 2,250-hp GP-30 . . . page 17



RATH PACKING CO. "Refer"-primed, top-coated, and stencilled in one shift—with TUFF Fast-Dry Enamel.

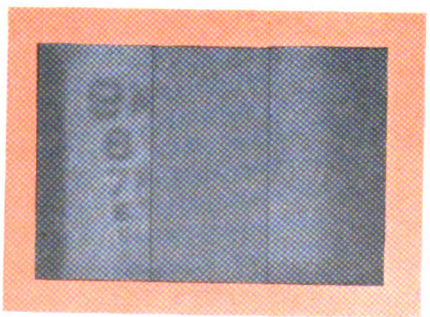
Two Major Coating Advancements for Railroa

TUFF FAST-DRY ENAMEL

One-day application, automotive-type beauty and durability.

Now—an ultra-durable, high gloss enamel system that enables you to prime, top-coat and stencil a car in 4 to 6 hours. In one shift, you can apply a brilliant, automotive-type finish with years of all-weather durability.

TUFF FAST-DRY ENAMEL provides three important advantages over present coatings: It goes on faster. Looks better. Stands up longer. Designed for metal or wood, TUFF Fast-Dry Enamel is ideal for coating or re-coating diesels, cars, track and signal equipment, bridges and buildings.



HIGH GLOSS. *Initial gloss superiority of* TUFF *Fast-Dry Enamel (left panel) is shown in this Kerr Definometer Reflectance test. Middle panel is coated with a well-known enamel, right panel with a leading lacquer.*

TUFF EPOXY SYSTEM

Major breakthrough in chemical-resistant coatings.

Everybody knows epoxy paints have good chemical resistance . . . but they chalk and lose gloss and color. Now Freight Liner introduces an epoxy system that accents the positive . . . *eliminates the negative.* New TUFF Epoxy retains its glass-like gloss, bright, crisp color, while providing maximum resistance to chemical spillage and atmospheric corrosion.

TUFF gives 800 square feet coverage p gallon, more than that of leading comp tive epoxy systems. Mixing and using T is easer, too, thanks to tolerant compone ratios (1:1 or 2:1) and long pot life (16- hours). Painters say TUFF Epoxy is as ea to apply as conventional one-compone paint.

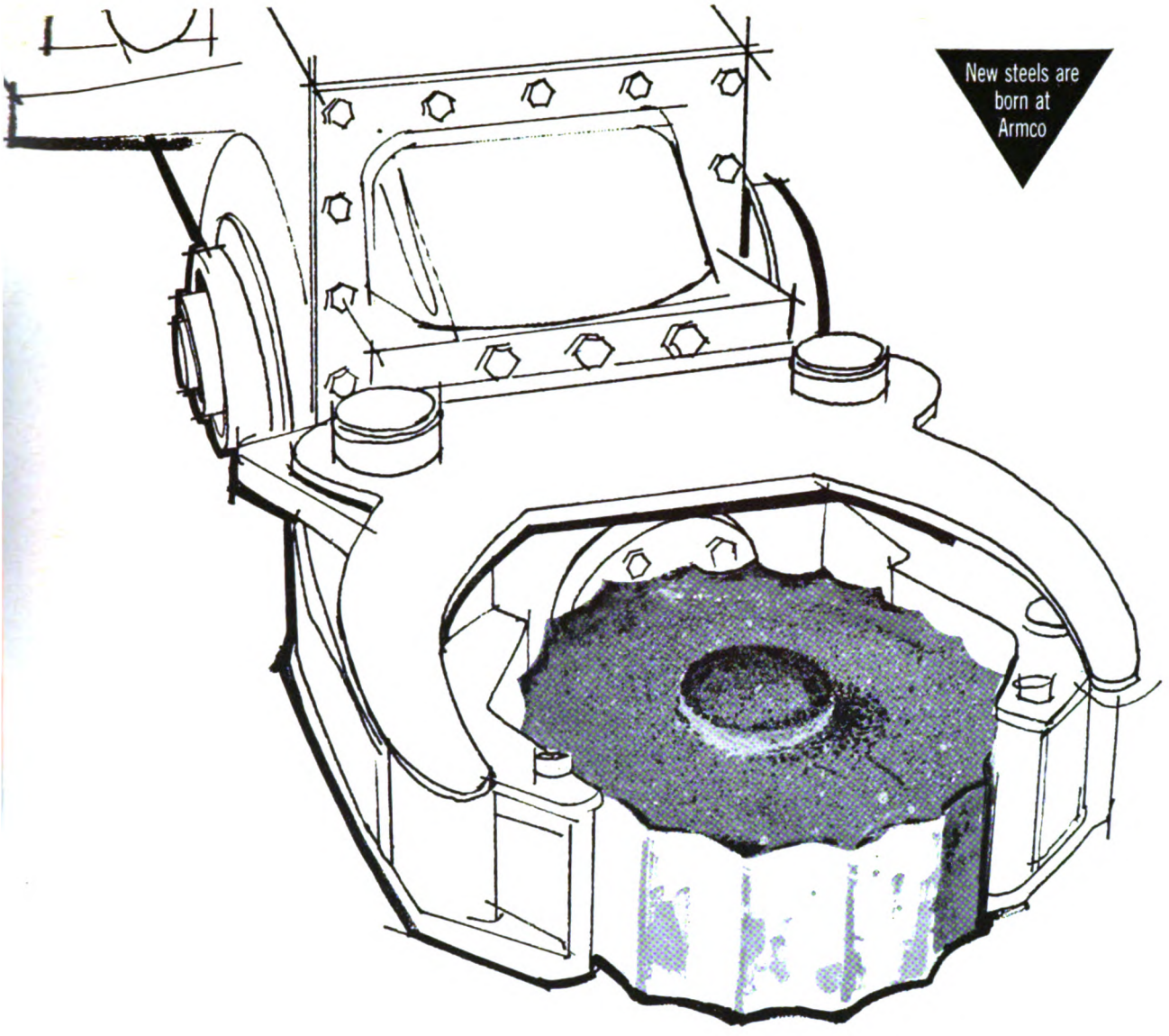
Both of these new TUFF coatings ar available as complete systems with rust inhibitive primers. For samples and techni cal literature, write H. B. FINCH, MANAGER, Freight Liner Products.

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CHEMICAL GROUP
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THIS MECHANICAL "PINCHBUG" HELPS MAKE ARMCO WHEELS EXTRA DURABLE

or superior results, wheel steel must be forged at just the ght temperature. That's where this "bug" comes in. Though mall, it performs a key job in Armco's closely-controlled heel-making operation.

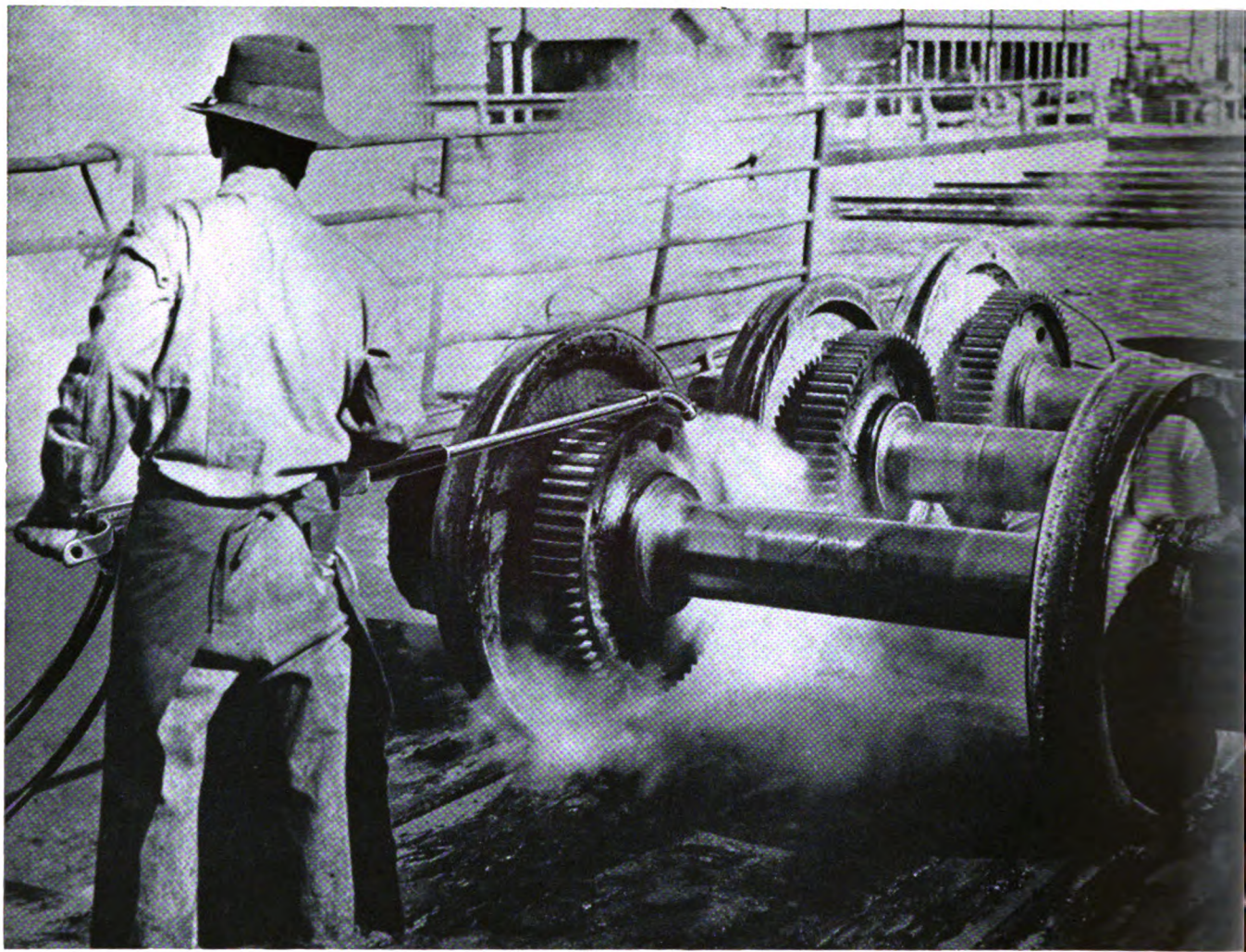
White-hot "slices" of steel are picked up at the heating urnace where they have been heated to exact temperature. ripped in the pincer jaws of this automatically-controlled ar, they're rushed to the forging press. Scale is blasted rom top and bottom of the slice en route. Moreover, this dependable little car performs its important job with split-second timing, hundreds of times per shift, day in and day out. After the slice is delivered, powerful forging and rolling operations convert it into an extra-durable Armco Wrought Steel Wheel.

Specify wrought steel wheels for safety and dependability

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REPORT FOR NOVEMBER

ASME Winter Annual Meeting

The Winter Annual Meeting of the American Society of Mechanical Engineers will be held at the Statler Hilton Hotel, New York, November 26-December 1. At a Fuels Session on Monday, November 27, three papers will be presented on the Thawing of Frozen Coal in Railroad Cars. The program for the Railroad Sessions on Wednesday and Thursday, November 29 and 30, is as follows:

WEDNESDAY, NOVEMBER 29
2:30 p.m.

Progress in Railway Mechanical Engineering 1960-1961.

Unusual Ventilating System Characterizes General Electric's New 2,500-Hp Diesel-Electric Locomotive — J. C. Aydelott, General Electric Co.

A Comprehensive Engine Cooling System for Diesel-Electric Locomotives—J. C. Aydelott and W. W. Peters, General Electric Co.

THURSDAY, NOVEMBER 30
9:30 a.m.

Relation of Wheel-Tread Wear and Brake-Shoe Wear — J. R. Jennings, general manager, Wilson Car Lines, Division of Wilson & Co.

Freight-Car Center-Plate Lubrication — W. H. Cyr, chief mechanical engineer, Canadian National.

Design and Testing of a Self-Supporting Aluminum-Covered Hopper Car — R. A. Campbell, manager development division, Railway-Marine, Aluminum Company of Canada, and J. H. Jenks, Aluminium Laboratories Limited.

2:30 p.m.

The Barber Cushion Tube — R. C. Williams, chief engineer, Standard Car Truck Co., and S. G. Guins, assistant director of research, Chesapeake & Ohio.

The Design of Cushioning Gears for Rail Car Applications — R. L. Hassenauer, General American Transportation Corp., and G. E. Novak.

British Railways Experimental Brake Van (Caboose) — B. T. Scales, British Transport Commission.

ASTM Changes Name

The name of the American Society for Testing Materials has been changed to the American Society for Testing and Materials, the word "and" in the name placing added emphasis on the Society's research work in seeking knowledge of the nature of materials.

Mechanical Association Officers Elected for 1962

The 1962 meetings of the Coordinated Mechanical Associations will be held at the Hotel Sherman, Chicago, September 17, 18 and 19. Officers elected during the recent meetings of the associations are:

AIR BRAKE ASSOCIATION. *President*—T. H. Bickerstaff, general supervisor air brakes, Santa Fe; *first vice-president, assistant secretary and assistant treasurer*—J. H. Russell, superintendent air brakes and steam heat equipment, New York Central System; *second vice-president*—C. W. Parker, chief mechanical engineer, Canadian Pacific; *third vice-president*—E. Pope, chief traveling diesel supervisor, Southern Pacific; *secretary and treasurer*—J. B. Ball.

CAR DEPARTMENT OFFICERS ASSOCIATION. *President*—H. L. Price, mechanical assistant-car, Santa Fe; *vice-presidents*—C. W. Kimball, chief of car inspection, Southern; E. W. Morris, engineer car equipment, Canadian Pacific; G. J. Flanagan, general mechanical superintendent-car, New York Central System; D. C. Graves, vice-president, Union Tank Car Co.; *secretary-treasurer*—E. W. Gebhardt.

LOCOMOTIVE MAINTENANCE OFFICERS ASSOCIATION. *President*—R. E. Harrison, manager, maintenance planning and control, Southern Pacific; *first vice-president*—C. A. Love, chief mechanical officer, Louisville & Nashville; *second vice-president*—

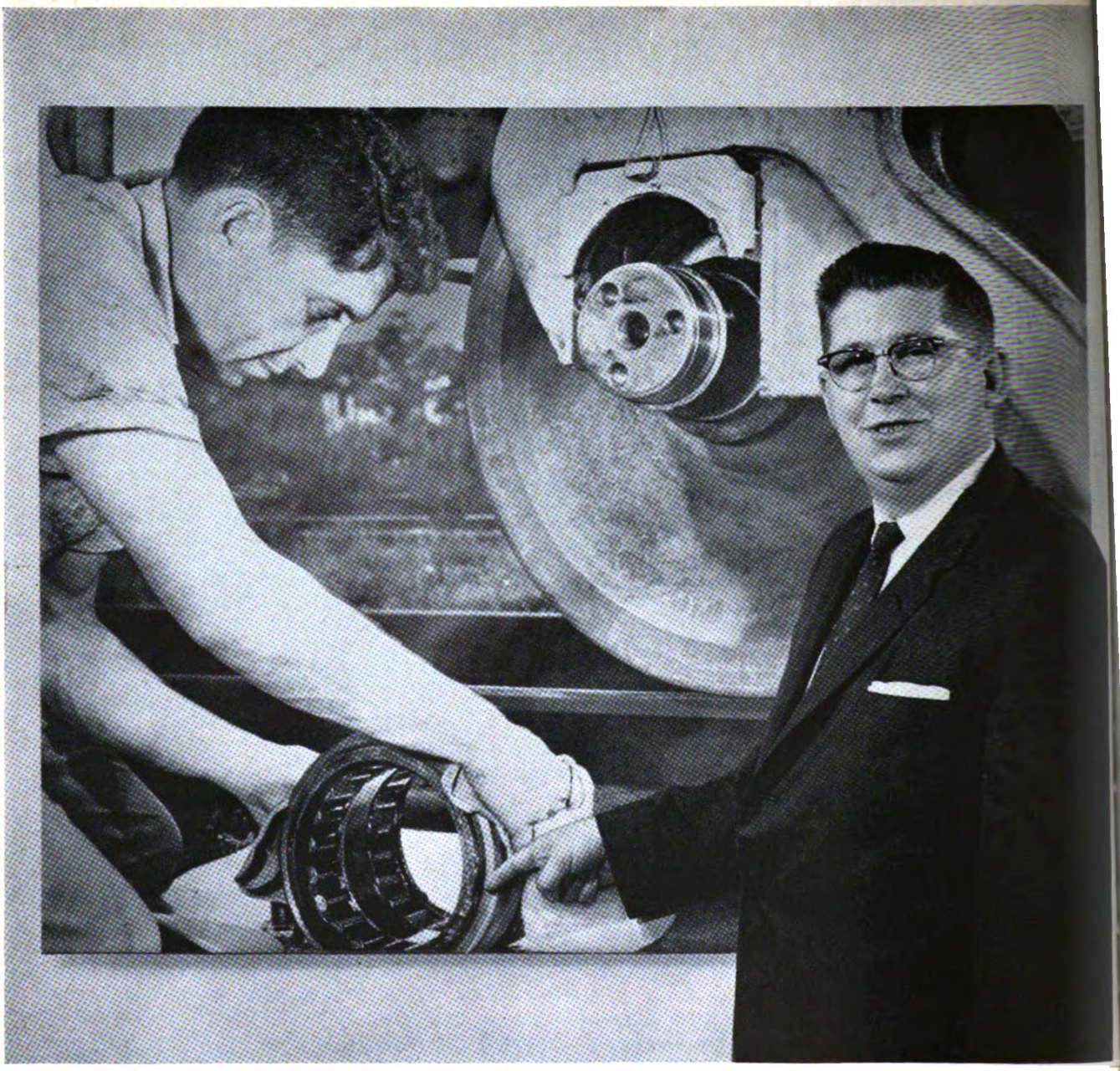
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TIME SAVING IDEAS FOR NOVEMBER

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Bob Moore, SKF Railway Sales Engineer, tells . . .

How SKF® "EXPEDITER" Roller Bearings minimize car maintenance and inspection costs

"We faced the facts of freight car journal bearing life when the SKF 'Expediter' was designed. (1) We recognized that the wider use of roller bearing-equipped cars would focus greater attention on inspection and maintenance. (2) Only a journal roller bearing designed to eliminate the necessity for removing wheels and axles from under the car, breaking press fits and disassembling the bearings, could provide the economy desired. These vital considerations were provided for in the SKF 'Expediter.'

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You can get more details on how SKF 'Expediter' freight car roller bearing assemblies cut maintenance and inspection costs by contacting Bob Moore in Chicago or by calling the SKF Railway Sales Engineer near you. Or, if you prefer to see some literature first, write: SKF Industries, Inc., Front Street and Erie Avenue, P. O. Box 6731, Philadelphia 32, Pa. 6121

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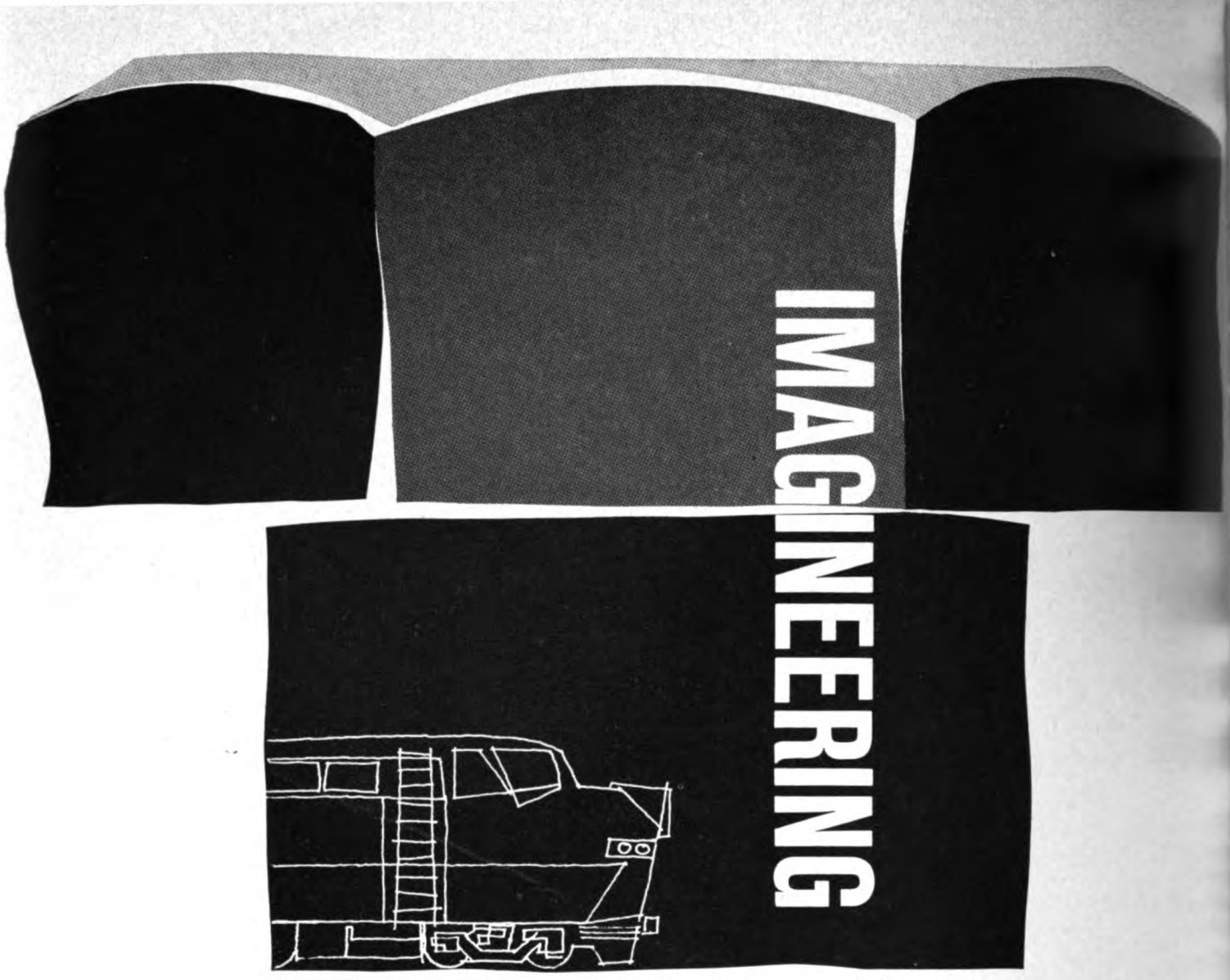
Advanced ball and roller bearing technology

"RL&C... Furnishes information that management of Coast Line could not provide in any other way."

"Railway Locomotives and Cars has proven an extremely valuable publication, particularly in keeping our on-line mechanical and electrical officers and supervisors up-to-date. It furnishes information on their particular work in a manner that the management of Coast Line could not provide in any other way. A supervisor becomes a better man when he is well-informed of the progress in his particular line in the industry and you can well imagine the difficulty which would be encountered were management to attempt this job."



J. W. HAWTHORNE
CHIEF MECHANICAL OFFICER
Chairman AAR Mechanical Division)



That's the bold, new look at Screw & Bolt that says high strength HEAVY HEX BOLTS replace rivets—or two bolts now do the work of three! ■ *Imagineering* is also the foresight that puts right at your doorstep, in just one source, a multitude of threaded fasteners and parts such as frog, track and switch bolts—drive spikes and dowels—brake pins and shoulder bolts. Then, there's the widest range of regular nuts and bolts. ■ When you need a fastener or threaded part, think of *imagineering!* Call Screw & Bolt!

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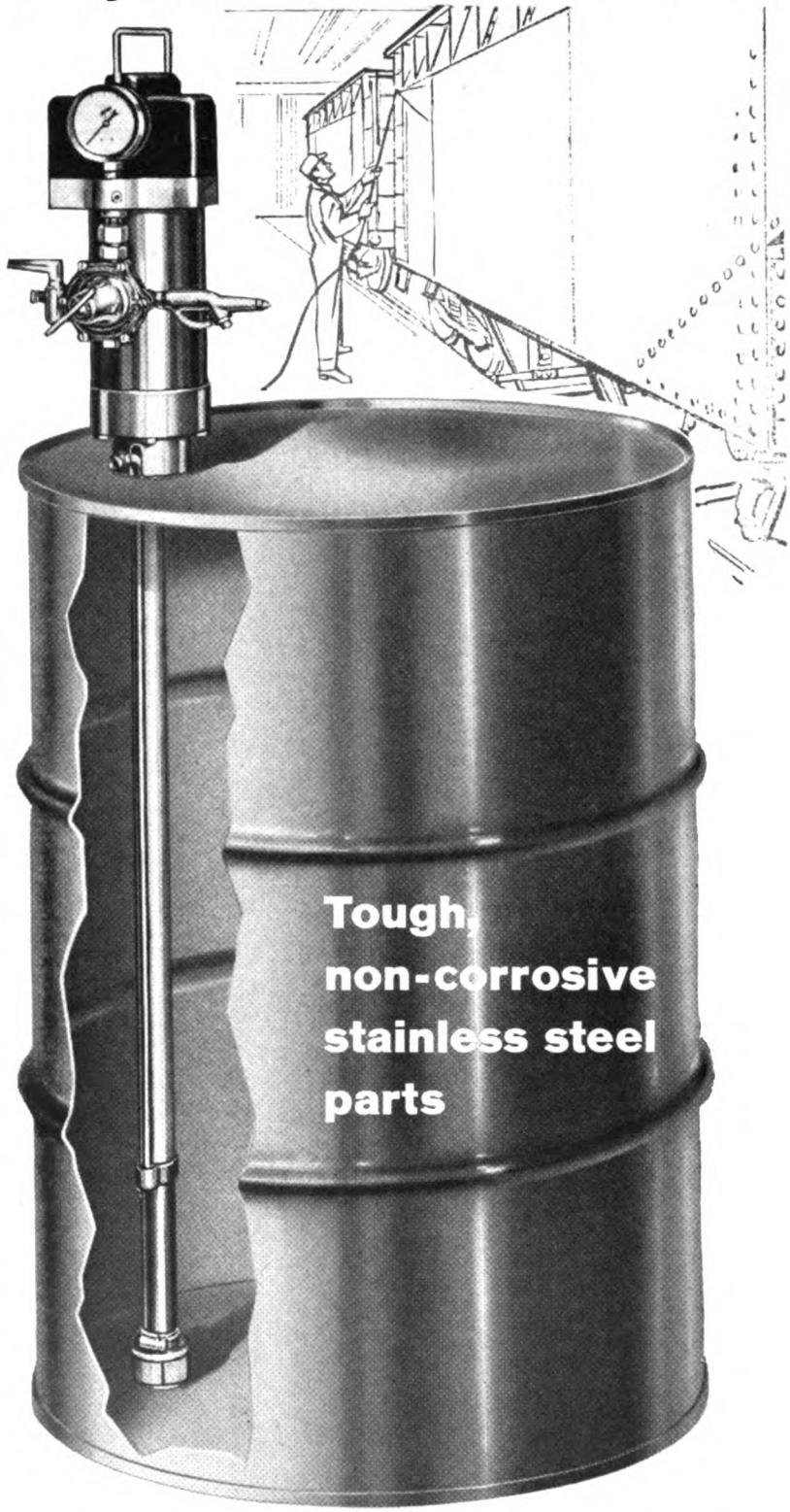
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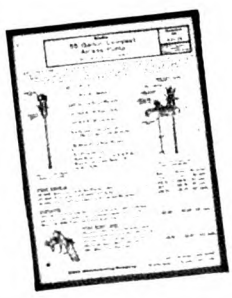


now spray direct from 55-gal. drums

This new Binks Model 41-8881 compact pump mounts directly into the bung of original 55-gallon containers . . . eliminates the cost of transferring material to another container before spraying.

The pump is designed for single gun airless spraying of protective and decorative coatings. All parts—which come in contact with the fluid being sprayed—are made of non-corrosive stainless steel. Parts subject to wear are of a special, hardened stainless steel.

Binks airless spraying gives you the speed and coverage of spray painting with minimum overspray—paint goes where you want it . . . on the surface . . . not into the air. Drift is greatly reduced, making this equipment ideal for use indoors or out. Result: considerable savings in both time and materials.

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Binks Everything for spray painting

Report

(Continued from page 5)

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Load-Limit Increase Deferred

A proposed increase of 5% in all freight-car load limits without changing axle designs, submitted for letter ballot after the June session of the AAR Mechanical Division, has been referred back to the General Committee for further consideration. While the load-limit increase failed to win the approval of car-owning members of the Division, they did approve the other 45 propositions in the letter ballot (RL&C, July 1961, p 23).

Among these is the ban on cast-iron wheels under interchange freight cars which will be effective on January 1, 1968. It will not be permissible to install wheels of this type manufactured after 1963. Called an "orderly" elimination plan when proposed, the proposition drew 44,100 negative and 1,845,406 affirmative votes. There was no opposition to a proposal for altering Interchange Rules 7, 8, 93, and 96 to permit mechanized billing covering interchange car repairs.

Orders and Inquiries for New Equipment

Placed Since Closing of October Issue

Locomotive Orders

FRISCO. *General Electric:* 8 U25B diesel units. Deliveries begun November 1.

Freight-Car Orders

CANADIAN NATIONAL. *ACE:* 200 50-ton box cars. For September delivery.

NORFOLK & WESTERN. *Company shops:* 1,000 85-ton coal hopper cars. Cost, $12,000,000. Work to begin on new cars about Jan. 1.

SOUTHERN. *Magor Car:* 200 aluminum high-capacity covered hopper cars. Volume capatons. Cost, $4,800,000. Deliveries to begin this city 5,000 cu. ft; weight-carrying capacity 100 month.

TRAILER TRAIN. Contracts for purchase of 600 cars, including piggyback and cars for auto-rack service (RL&C, Sept. p 7) awarded as follows: *ACF*, 153; *Bethlehem Steel*, 69: *GATZ*, 13; *Pullman-Standard*, 365.

UNION PACIFIC. *ACF:* 10 85-ft Hitch Hiker piggyback flat cars, specially adapted for transport of solid fuel missiles and equipped with newly developed cushion underframe. Cost, $265,000.

WABASH. *Paragon Bridge & Steel:* 165 tri-level auto racks.

Notes and Inquiries

Canadian National will convert 250 end bunkers to heated box cars at company shops by mid-1962.

Delaware & Hudson, during the first nine months of 1961, has upgraded 1,750 box cars at an estimated cost of $100 each and 1,300 hop cars at an estimated cost of $48 each. Six 1,[illegible] hp diesel-electric locomotives have been conver to 1,800-hp units at a cost of $744,000, exclu trucks which were remanufactured by the rail and supplied to the manufacturer for applicat

Louisville & Nashville will spend $1,725,[illegible] rebuild 500 50-ton hopper cars in company sho $688,000 to purchase 55 jumbo 70-ton cove hopper cars, $153,000 to install metal covers 32 gondolas, and $69,000 to install bulkheads 49 flat cars.

New York, Susquehanna & Western, in an a plication filed with ICC, is seeking a governm guaranty of a $555,000 loan to purchase th 1,800-hp diesels from Electro-Motive. Acquisitio road says, would permit retirement of six old loc motives and bring savings estimated at $[illegible] a year.

Philadelphia Passenger Service Improvem Corp. has "tentatively" accepted bids from Bu Co. for construction of 36 passenger cars at total cost of $9,186,500. Included are 24 stainle steel, electric MU cars costing $6,186,000, wi final approval contingent on completion of leasi arrangements with the Pennsylvania and Rea ing. (RL&C, Sept., p 7); and for lease to th Reading, 12 RDC cars costing $3,000,000 with a proval awaiting completion of financing arrang ments.

Santa Fe will acquire 100 8x8x20-ft containe and 25 specially equipped flat cars for containe ized mail handling.

Trailer Train directors have authorized pu chase of 650 new cars, in addition to 600 list above.

The Division has developed revised standards for box car doors and for the interior dimensions, end wall thickness, and sizes of ends, sides and roofs in the interest of simplification and standardization. It will also be required that the exact height and width of box-car door openings be stencilled on the exteriors of the doors for the convenience of shippers.

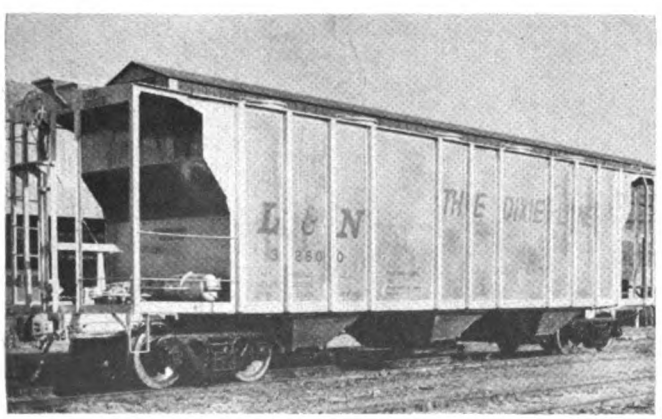
Another new standard applicable to all freight cars is the new Mechanical Division Plate B-1 showing maximum width for cars having various truck centers up to 75 ft (RL&C, August 1961, p 18).

A new requirement that threadless pipe type flange air brake fittings be used as replacements in maintenance will be effective in Interchange Rule 3 on January 1, 196 Also adopted is Specifications for Tw Piece Rivets Suitable for use in Applic tion of U. S. Safety Appliances as a re ommended practice. New specifications f locomotive fuel oil filter elements of th throw-away type used on the discharge si of locomotive fuel transfer pumps wer also accepted.

Hot Box Statistics

Hot Box Statistics recently issued by th AAR Mechanical Division show the be June performance over any of the past l years during which these figures have bee

(Continued on page 42)



Aluminum plate, extrusions, and castings have been used in the first of 40 new 90-ton aluminum covered hopper cars delivered to the Louisville & Nashville by Pullman-Standard. Based on PS-2 covered hopper design, the aluminum units have a light weight of 53,000 lb—more than 10,000 lb lighter than an all-steel car of similar design. According to the L&N, the cars will be assigned to alumina service. Because alumina is loaded hot, high-strength, weldable aluminum alloy 5454 was chosen for all plate and extruded parts. Approximately 10,500 lb of Alcoa aluminum are used in each car for all parts which come in contact with lading. The PS-2 aluminum cars are designed for a capacity of 3,506 cu ft and equipped with 90-ton trucks. They are 51 ft ¾ in. over strickers; 10 ft 6¾ in. wide, and 13 ft 3⅝ in. high.



An experimental car with 18-ft door openings fitted with two 9-ft sliding doors on opposite sides has been built by the Bangor & Aroostook "especially for carrying finished lumber in strapped packages and other bulky commodities adapted to mechanical loading with fork lifts." The car, converted at the road's Derby, Me., shops, was a steel box car of 40 ft 5 in. inside length, 9 ft 2½ in. inside height, and 9 ft 1½ in. inside width. Two steel stanchions in each 18-ft doorway keep the load in place during transit but telescope and fold away during loading. Center and side sills are heavily reinforced to compensate for removal of steel for the extra-wide doors. Initial experience indicates that the car can be mechanically loaded in about 70 min as compared to manual loading time of from 16 to 18 man-hours.

ATIONAL CUSHIONING SYSTEM FOR AUTOMOBILE RACKS

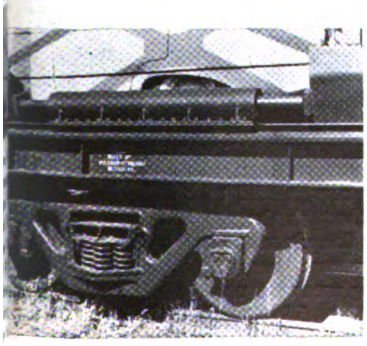
*cceleration of Auto Rack 0% lower than Flatcar 8.5 mph impacts.**



S A LEADER in design of shock absorption evices, National has developed a special cushioning ystem, using proven components, that provides four nportant advantages for automobile transportation:

1. Auto rack acceleration 60% lower than freight car body acceleration at 8.5 mph impacts*
2. Positive *re-centering* of rack on car
3. Economy of spring-rubber combination over all-rubber devices
4. Impact tested under actual operating conditions

National Cushioning System-equipped automobile racks are now in service.
Automobile racks present unique problems in cushioning that cannot be solved with conventional hock-absorbing devices. We suggest that you consult National now for full details.



*Auto manufacturer's test data shows that auto rack acceleration was 60 to 65% lower than car body acceleration at 8.5 mph impacts.
National cushioning units for automobile racks consist of four separate tubular housings, one at each corner of the car, with plungers contacting vertical beams of the rack. Two housings at one end contain rubber pads similar to those used in National rubber draft gears; two housings at opposite end each contain four inner and outer steel coil springs of the same type now used in the improved National M-17-A draft gear. A-4631A

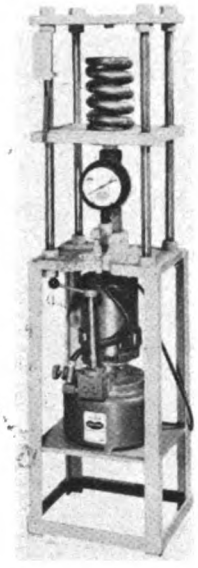
Transportation Products Division

International Division
Cleveland 6, Ohio

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66 Portland St., Toronto 2B, Ontario

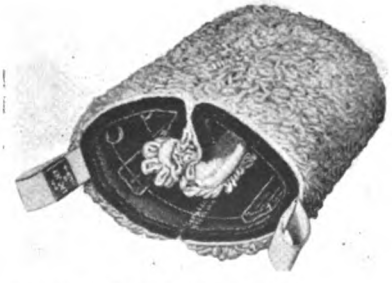
NATIONAL CASTINGS COMPANY
Cleveland 6, Ohio

COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • JOURNAL BOXES • ROLLER BEARING ADAPTERS • NATIONAL SPEEDLOADER CONTAINER HANDLING SYSTEM



Spring Testing Machine

A railroad spring testing machine, developed in connection with the spring condemning limit program approved by the AAR, replaces visual examination. It is said to provide a fast, accurate method of determining the effectiveness and usability of freight car truck springs after they have been in service. The tester is powered by a Ram-Pac electric hydraulic pump with a specially designed gage with measures 5,500 and 2,200 lb, respectively, for outer and inner springs. The load on the spring is produced with a Ram-Pac ram. To operate, the switch and control handle on the pump are turned to the "on" position, which forces hydraulic fluid into the ram, causing the plunger to raise and exert a constant force on the spring. This is accomplished in less than 30 sec. The pump can be set at the valve for either a constant 5,500-lb or 2,200-lb load so that assembly line testing is possible. *Duff-Norton Co., Dept. RLC, Pittsburgh, Pa.*

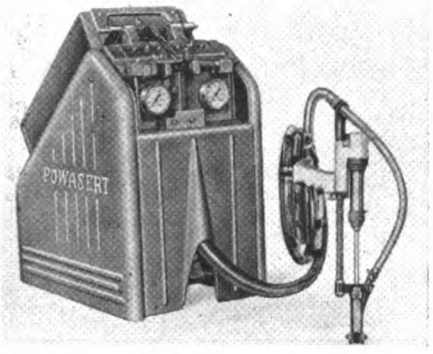


Journal Lubricator

A tempered torsion spring assembly in the improved Jet journal lubricator is said to assure positive contact of the surfaces at all temperatures and to increase durability. The center feed principle is used, a wick providing a greater flow of oil to the journal. The contact surface is chenille which is locked with the felt backing to prevent raveling. The felt serves as an additional oil reservoir. No anti-rolling device is needed to hold the lubricator in position. The lubricator has been approved for test by the AAR. *Lubrication Products Co., Dept. RLC, 5605 Herman ave., Cleveland 2, Ohio.*

Wide Flange Beams

Eleven wide flange beam sizes have been added to the USS line of rolled structural shapes made from quenched and tempered alloy steels (RL&C, Aug. 1961, p 10). Shapes for railroad commuter cars are among the orders received since the new USS T-1 and T-1 type A steels were announced in May. *United States Steel Corp., Dept. RLC., Pittsburgh 30, Pa.*

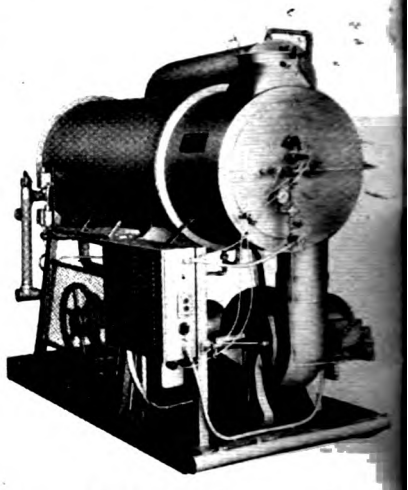


Feeder Unit for Automatic Nailers

Nails from ½ to 4 in. length with any type of shank head and point, and ½- to 2-in. screws are handled in the new feeder unit developed for Powasert portable, automatic nailing and screwdriving machines. Nails or screws are dumped from bulk containers into a tray where they are automatically aligned, point first, and fed one at a time through a transparent, flexible hose to the gun or driver unit. Air at 90 lb pressure is the only power used for aligning, feeding, and driving the fastener. Nails may be driven flush or counter-sunk. Screws usually require no pilot holes, even in hard wood. *United Shoe Machinery Corp., Dept. RLC, 140 Federal st., Boston 7, Mass.*

High Capacity Oil Heaters

Three models—a 300,000 Btu/hr unit, a 7,000,000 Btu unit and 13,000,000 Btu/hr unit—have been added to the Hi-R-Temp hot oil heater line. According to the manufacturer, temperatures of 600 deg F are



obtained by heat transfer oils without the pressures associated with steam plants. The units are said to modulate automatically, require no water treatment, eliminate problems due to freezing or corrosion, and are completely unitized. *Vapor Heating Corp., Dept. RLC, 6420 West Howard st., Chicago 48.*

Liquid Detergent

Speedet, a heavy duty liquid detergent for removing road dirt, oil and grease from running gear, trucks, underframes, fuel and water tanks, and interiors and exteriors of diesel units. It is effective in dilutions as low as 1 to 40 parts of cold water and is said to leave surfaces in a non-tacky, film-free condition. Because no solids can accumulate or precipitate out in solution tanks, clogging of spray nozzles is avoided. *Oakite Products, Inc., Dept. RLC, 146 Rector st., New York 6.*



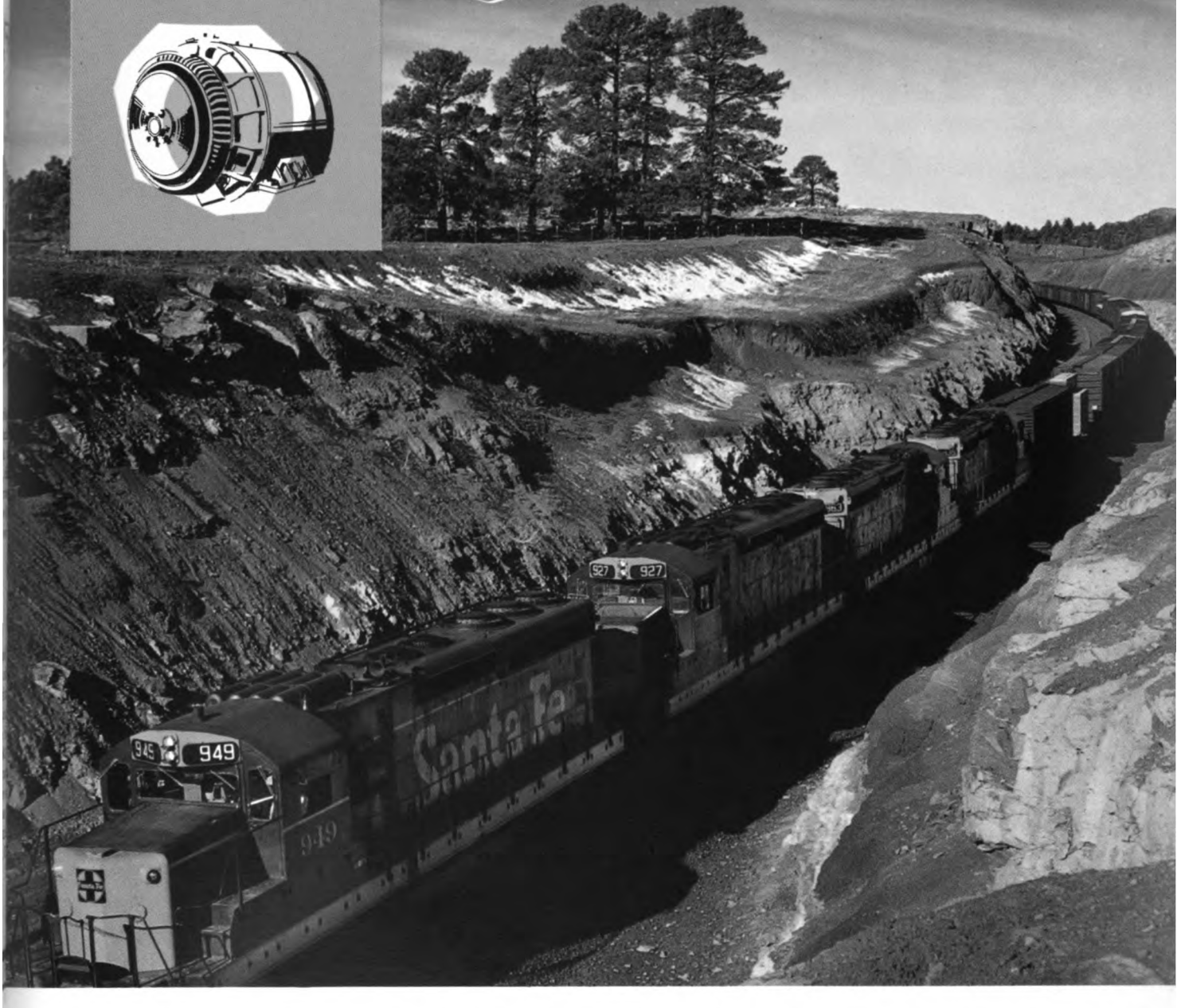
Car Interior Cleaning

Out-of-service time of tank and covered hopper cars is said to be considerably reduced through the use of the RX jet wash system for cleaning car interiors. It is a high-pressure spray unit which permits cleaning pressures up to 400 psi at temperatures up to 385 deg F, with virtually any combination of cleaning agents—steam, hot water with chemicals, detergents, or

(Continued on page 45)

THE SANTA FE'S FAST FREIGHTS KEEP EXACTING SCHEDULES WITH AN ASSIST FROM NATIONAL BRUSHES

TRADE-MARK



Progressive railroads like the Santa Fe are using fast freights for improved, accelerated service for their customers. This modern service requires trouble-free motive power with minimum lost-time for maintenance.

Every component in the complex locomotive—no matter how small or large—must perform dependably under conditions of heavy loading and high speed to meet the exacting requirements of the Santa Fe.

"National" generator brushes—small but vital components—offer proved commutation and life qualities and operate with the reliability so necessary for today's progressive railroad service.

One of our contributions to improved railroading is a positive service program on carbon brushes. Just call your "National" Brush Man or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. In Canada: Union Carbide Canada Limited, Toronto.



Contact your "National" Brush Man

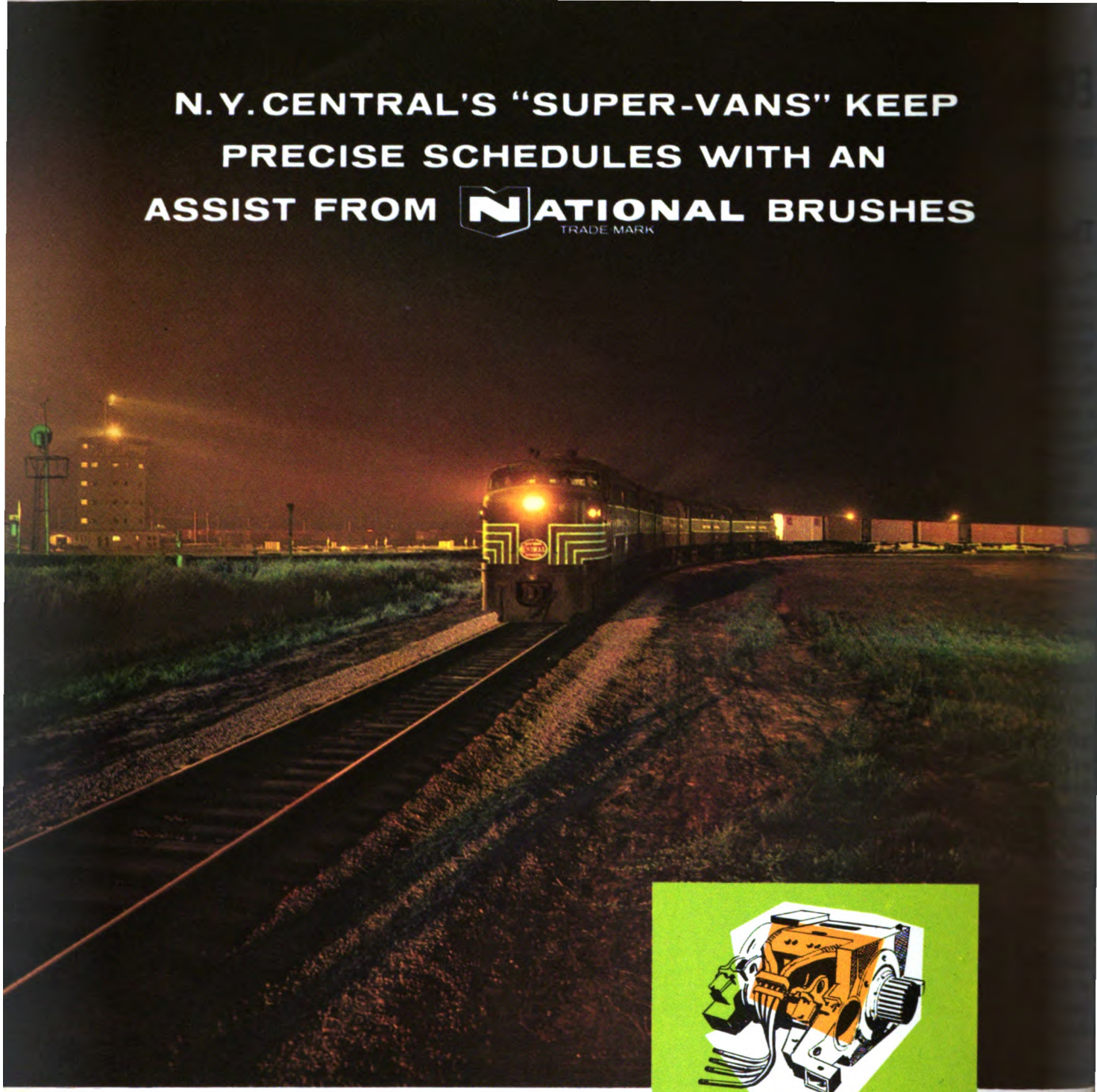
UNION CARBIDE

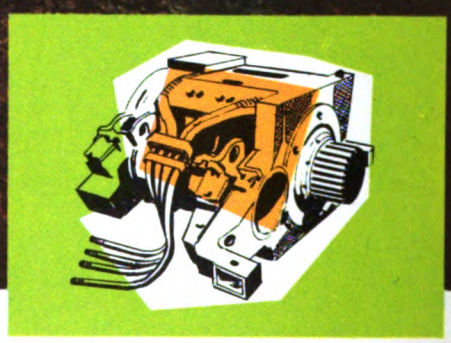
"National" and "Union Carbide" are registered trade-marks for products of

NATIONAL CARBON COMPANY

N.Y. CENTRAL'S "SUPER-VANS" KEEP PRECISE SCHEDULES WITH AN ASSIST FROM NATIONAL BRUSHES

TRADE-MARK





Because of fast freights or "Super-Vans" as they are known on the New York Central, today's major tonnage is returning to the progressive railroads of the nation.

To maintain precise schedules, every component in the consist—no matter how large or small—must offer exacting performance and rugged reliability.

"National" traction-motor brushes—wherever they are used—provide dependable life and commutation and thereby contribute to added miles with a reduction in commutator maintenance costs.

To National Carbon Company, improved railroading means a positive program to help the roads solve problems imposed by constantly changing and more difficult electrical conditions. To realize this assistance, just call your "National" Brush Man or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.



Contact your "National" Brush Man

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EDITORIALS

he Safest Railroad

ıe Hydroframe-60 box car, a Pullman-Standard devel-ent which includes the long-travel, hydraulically cush-ned underframe, has come under the fire of the railway otherhoods. The Brotherhood of Railway Trainmen, e Order of Railway Conductors and Brakemen, and the vitchmans Union of North America have joined in filing statement with the ICC charging that these cars are in olation of Safety Appliance statutes and regulations. hey urged that use of these cars be prohibited.

Six specific objections have been raised by the brother-ɔods to the design (RL&C, January 1961, p 17 and Sep-mber 1961, p. 65). These objections refer to the dis-nce between coupled cars when one or both are of the ydroframe-60 type, to the aligning and operating of ɔuplers, and to the handbrake location. The unions' atement continued: "Pullman-Standard and the AAR ate the concern of the railroad industry with the $100,-00,000 which the industry pays annually to property amage claimants. The primary object of the Hydro-ame-60 car is to reduce these damages. Neither pro-stant mentions the fact that the industry also pays $100,-00,000 yearly in personal injury claims." The state-ent went on to describe the casualties which produce ese injury claims, concluding "The Hydroframe-60 box ar design, violating as it does both the safety statutes and ıe safety regulations, will increase these statistics tragi-ally if it is permitted to be placed in use on the American ailroads."

Union Tank Car Co. has just concluded a similar and rotracted argument over the elimination of side running oards on one type of tank car, its so-called "Hot Dog" esign (RL&C, Sept. 1961, p 5). Here also members f the Railway Labor Executives Association protested ɔng and loudly about the dangers inherent in a new car esign.

Commenting this protest, the ICC stated: "Today, rainmen seldom traverse the tops of cars in road service, ut may do so in emergency. In switching or yard service, hey traverse cars whils running at slow speed, but gen-rally descend to the ground when necessary to go from nd to end of a car or cut of cars. While there is no pro-ıibition against trainmen traversing the tops of cars or ısing running boards, railroads as a rule do not require hem to do so and, in fact, discourage such action. It is ɔractically impossible to traverse some cars, such as gon-lolas or hoppers, when empty, or when these cars are oaded with scrap coal, or gravel that does not afford table footing.

"We are impressed," the Commission continued, "by he fact that nearly half of all freight cars—such as hop-ɔer, gondola, and flat cars—owned by Class I railroads in he United States are not equipped with running boards and are not required to be so equipped by the Safety Ap-pliance Standards. This strongly indicates that running oards, at least on certain types cars, are not needed."

In the cases both of the Hot Dog and Hydroframe-60, car designers have been attempting to provide the equipment which can make railroads truly competitive, probably insuring ultimately that there will even be a railway industry. It is strange that those railway unions which frequently accuse carriers of failing to take steps to maintain their competitive position will take stands which may well prevent the railroads from doing so. Unless equipment designs and operating practices can be tailored for today's conditions, the ultimate in railway safety may be achieved by default—by drying up the very traffic which provides today's jobs.

Rather than prohibiting the use of Hydroframe-60, it would seem to be a good time to consider the elimination of running boards and side ladders on cars where they are not needed by shippers and consignees for loading and unloading operations. The AAR Mechanical Division has been considering the elimination of these safety appliances, and this might be the time to make such a proposal.

Locomotive Bonanza

Motive power is in the news and the market place is being stocked with a variety of makes and models. This is a healthy situation for the buyers who are "in the market" for new power.

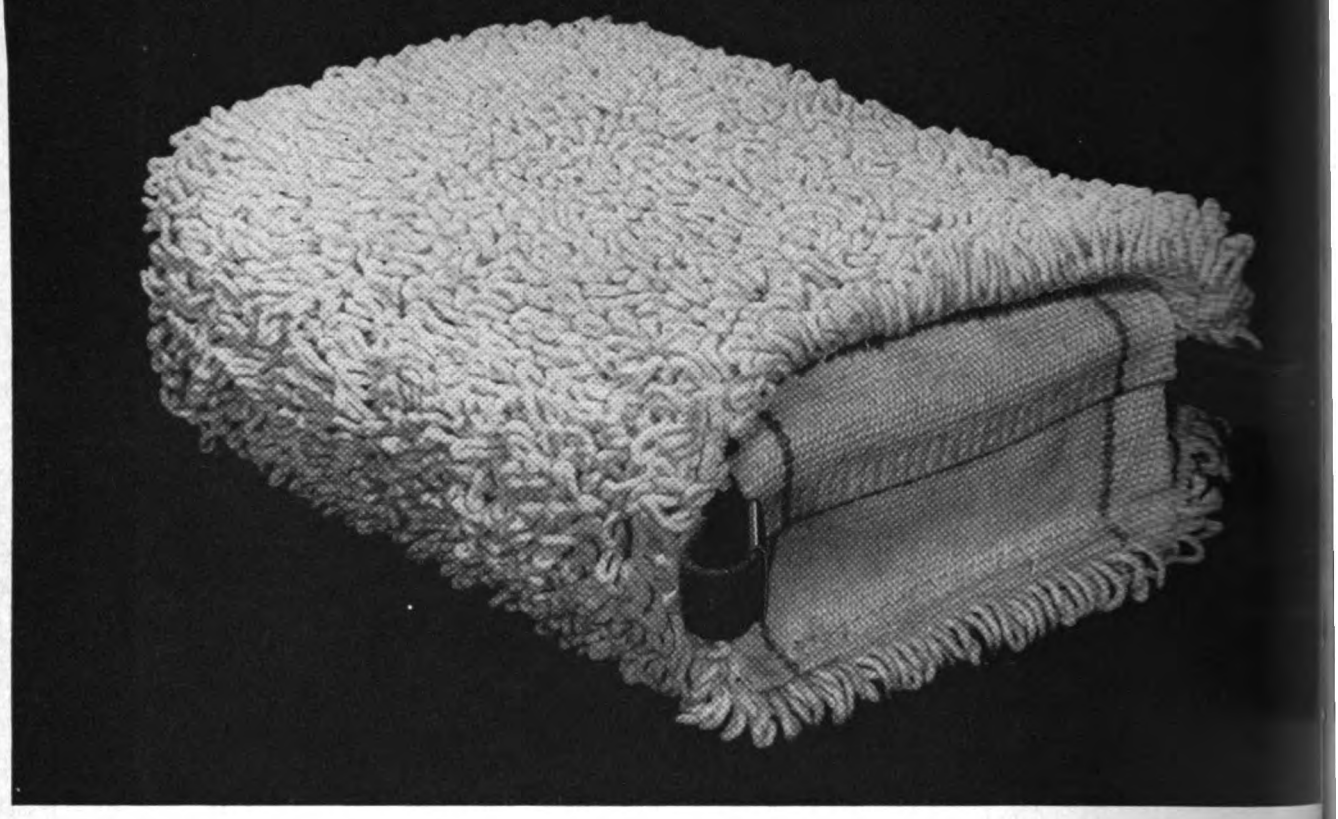
Elsewhere in this issue we describe the GP 30, the latest addition to the Electro-Motive line that was unveiled on October 18. This is a four-axle, four-motor unit rated at 2,250 hp. This means that all builders now have four motor road switcher type locomotives, rated at over 2,000 hp.

Then, even before the ship (due October 30) that was bringing the six Krauss-Maffei 4,000-hp diesel-hydraulics locomotives for delivery to the Southern Pacific and the Denver & Rio Grande Western had docked at Houston, Texas, another German firm came into the domestic diesel-hydraulic picture. On October 25 the Henschel-Werke GMBH of Kassel, West Germany, announced that "it will make available a 4,000-hp diesel-hydraulic to American railroads very shortly". This locomotive is "at present in the development stage and being built in close cooperation with the German Federal Railways."

Other domestic builders are busy, too. Alco has come up with the four-motor DL-721 and the six-motor DL-722 with the Alco 251C engine which the builder claims are the only units to deliver 2,000 hp with a 12-cylinder engine. And General Electric is getting a toehold in the domestic market with the recent news that eight U25B 2,500-hp units are going to the Frisco and eight to the Santa Fe, in addition to the four ordered earlier by the Union Pacific.

All this is good news to the railroads. The diesel fleets need revitalizing. And when a "shopper" needs something it's to the buyer's advantage to have several makes and models from which to choose.

new MAGPAD* with NALUR* foam core...



a low-cost lubricator that also has internal wicking and lock-stitched tufted cover

The heart of the new MAGPAD is NALUR—a specially formulated acrylonitrile foam rubber developed and produced by National Lead Company. It is highly resilient, has low oil swell characteristics and excellent resistance to compression set at high temperatures.

Outer cover is a heavy high-quality chenille, lock-stitched to withstand a 10-lb. minimum pull on tufts. End closures are tough cotton belting.

Ample internal wicking is provided by 25-ply candlewick routed through ½" vertical orifices to provide unrestricted flow of oil.

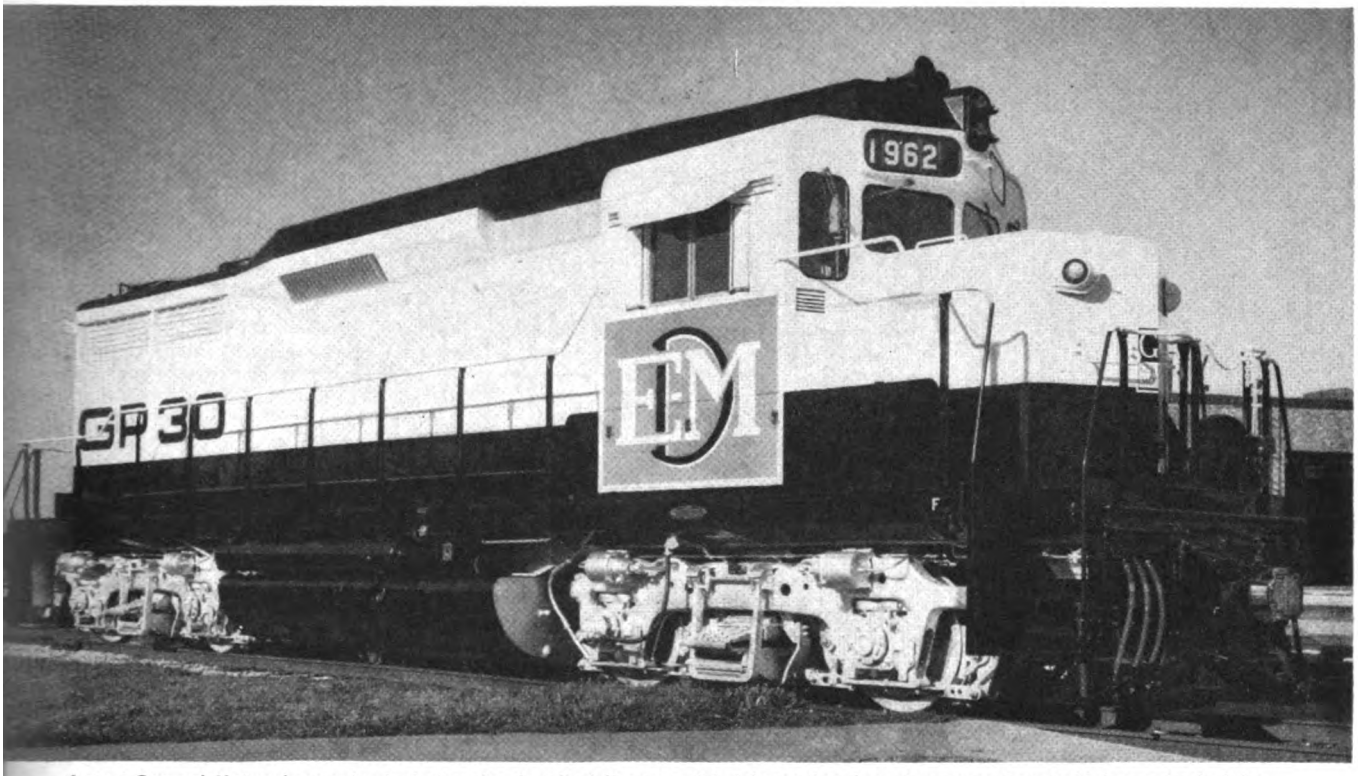
Renovation—The MAGPAD with NALUR is sturdily made—its rugged construction permits renovation by any standard method in railroad use.

Get the full story on the new *low-cost* MAGPAD with NALUR. Ask our representative or write for details. Magnus Metal Corporation, 111 Broadway, New York 6, New York or 80 E. Jackson Blvd., Chicago 4, Illinois.

**Trademark of National Lead Company*

MAGNUS METAL CORPORATION
Subsidiary of NATIONAL LEAD COMPANY

GEARED TO PROGRESS P R I MEMBER



Latest General Motors locomotive is designed to handle full range of freight services from drag operations to high-speed schedules.

Four-Motor, 2,250-hp Model . . .

General Motors Introduces GP-30

The highest horsepower model of e General Motors General Purpose comotive line was unveiled last onth. The 2,250-hp, four-motor, ur-axle GP30 was shown to railroad ficers at the General Motors Tech-cal Center at Warren, Mich., on Oc-ber 18. Designed for a full range of rvices from heavy drag to high-speed eight operation, the locomotive has en described by GM as "the widest nge locomotive on the rails today."

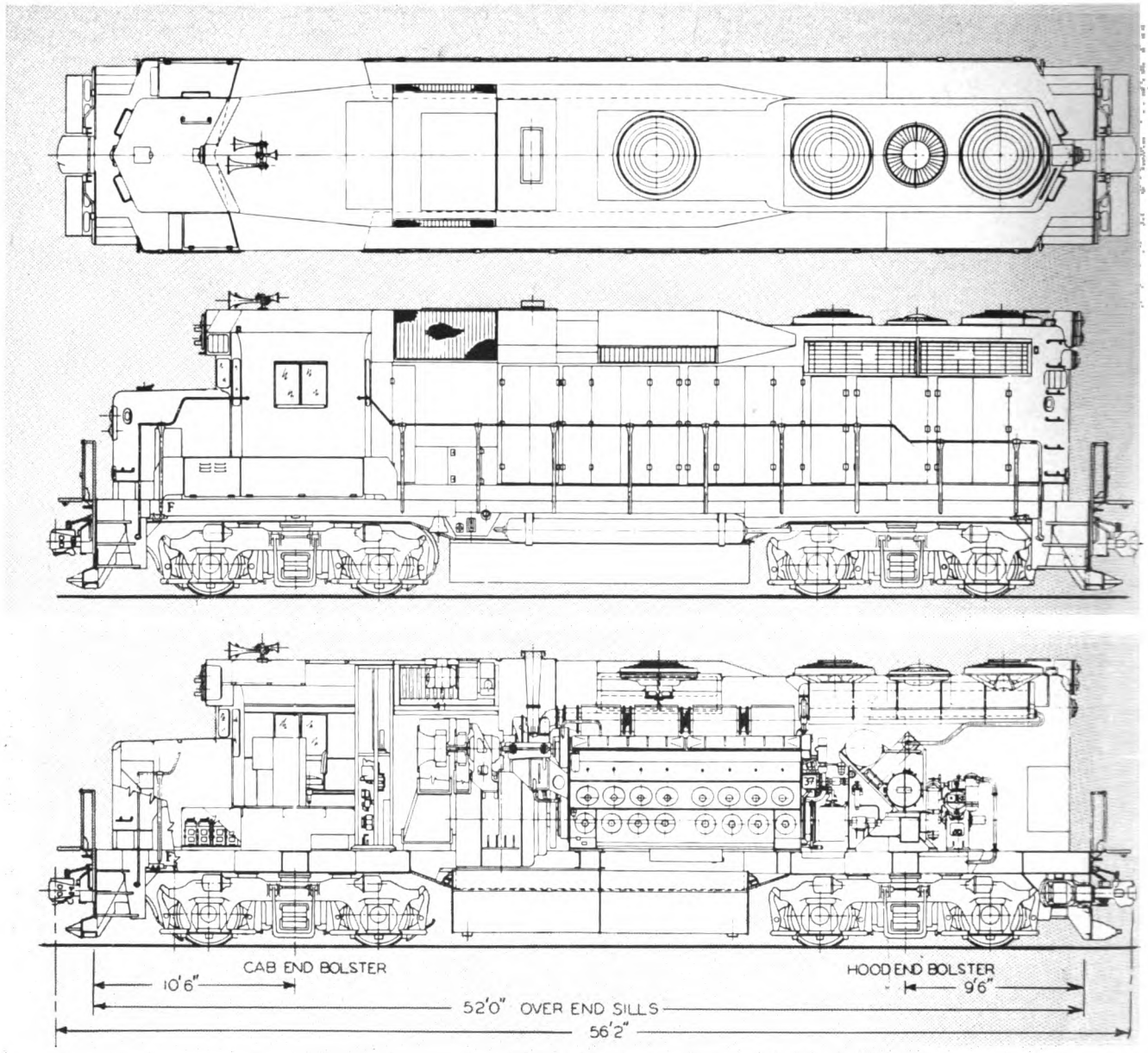
"While capacity has been substan-ally increased and the locomotive's nge extended broadly both in low-d high-speed freight operation, the P30 retains the flexibility and ver-tility of predecessor GP locomo-ves," Richard L. Terrell, vice-presi-ent and general manager of the Elec-o-Motive Division pointed out. "Im-rovements provide a further reduc-on in scheduled maintenance for the P30 as compared with the GP20, the 2,000-hp locomotive introduced by EMD in May 1959. With some 30 structural and operational improvements, all aimed at increasing the locomotive's economic value, the GP30's increased capacity permits operation of present freight schedules with fewer units. Two new units replace three older, 1,500-hp locomotive units."

Prime mover for the GP30 is the GM 567-D3 diesel featuring a turbo-charger which is driven directly from the engine gear train at low engine speed but operates as a free-running turbine powered only by the engine's exhaust at higher speeds. This arrangement is designed to maintain engine efficiency at high altitudes with little or no reduction in rated horsepower. The GP30 features further improvement in specific fuel consumption as compared with the present turbo-charged GP20, it was pointed out.

The diesel engine is coupled to a D-22 main generator and D-14 alternator. Power is transmitted to the axles through four D-57 traction motors, a newly developed model capable of transmitting the higher horsepower at all locomotive speeds.

In addition to the new motors, other features of the locomotive include the following:

- Single package pressurized cooling system.
- Inertial-type air-filtration system, eliminating carbody filters.
- Improved running gear.
- Greater fuel capacity.
- Water-cooled air compressor with high-capacity crankcase.
- Sealed high-voltage electrical cabinet.
- Static load control and programming switch.
- Load regulator replaced by a small rheostat with elimination of many wearing parts.



Total loaded weight of locomotive on rails is 245,000 lb. Height over cab is 15 ft 1 in. Driving wheel diameter is 40 in.; rigid wheel base of truck is 9 ft. Supplies carried by locomotive: fuel—1,700 gal.; lubricating oil—220 gal.; cooling water— 227 gal.; sand—40 cu ft. Maximum speeds and corresponding gear ratios available are: 65 mph—62:15; 71 mph—62:15; 77 mph—61:16. EMD engineers say locomotives give 10% higher tractive effort at all speeds as compared with the GP20.

- Improved high-speed wheel slip control.
- Improved weight distribution and balancing of locomotive components.

The new D-57 traction motor has a 965-amp current rating as compared with the 900-amp rating of the D-47, the motor previously standard on most EMD road locomotives. New design features and assembly techniques are expected to increase motor life and reduce maintenance requirements.

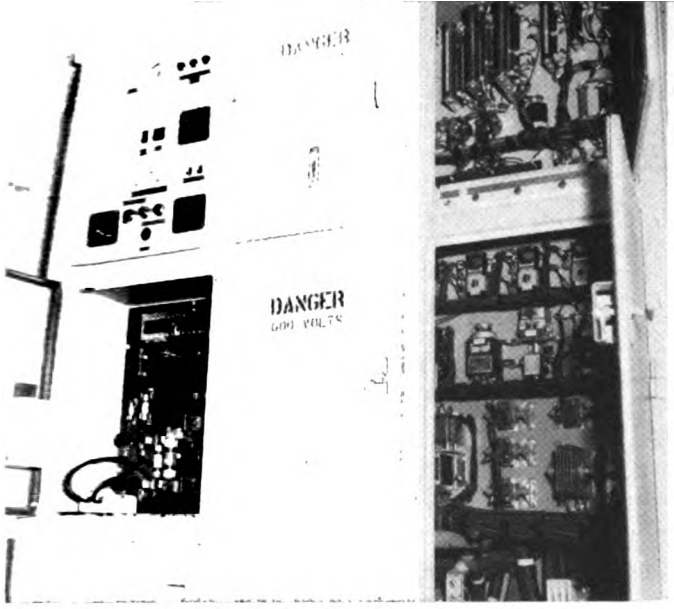
Improved commutator stability has been obtained as a result of improved high temperature seasoning. The armature is placed in a 200-deg oven and rotated during the seasoning operation.

In place of conventional phenolic wedges used to keep coils in place, the D-57 armature has special non-magnetic zig-zag steel wedging which improves the motor cooling characteristics. Modified silicone varnish used for the insulation has greater moisture and solvent resistance, more bond strength, and improved flexure characteristics.

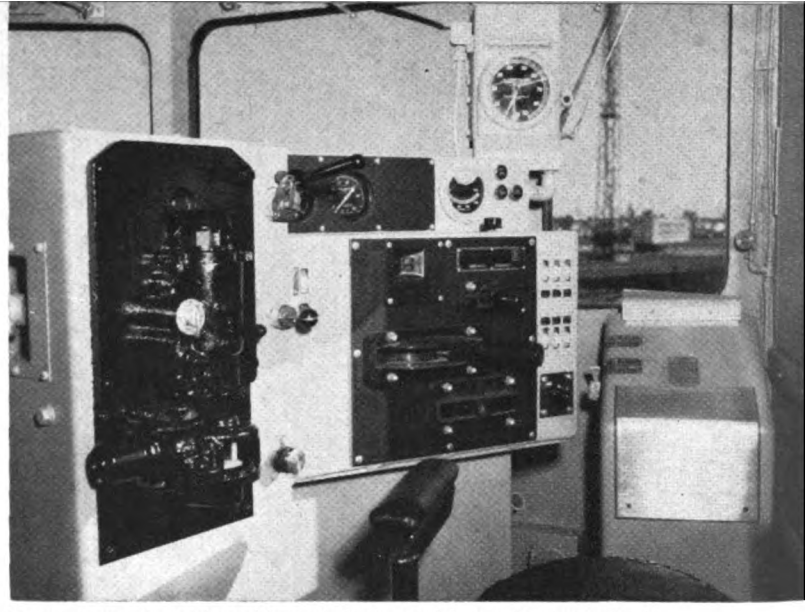
Brush holders with constant pressure springs are said to give 50 to 75% increased brush life. Spring action holds each brush segment in intimate contact with the commutator, reducing brush bounce which is a major factor in sparking and commutator bar burning. Non-conductive silicone rubber insulating boots over the brushholder studs practically eliminate tracking.

The new traction motor gear case has a wide gutter with a return duct permitting grease to drain back into the gear case instead of to the roadbed. The gear case can also absorb an overcharge of grease without purging lubricant through the axle seals.

Traction-motor support bearings, equipped with four felt flange lubricators, are said to produce a 50% increase in bearing flange life. Lateral movement of the axle or traction motor causes the wheel or gear hub to contact the oil-saturated felt strips, applying the proper amount of lubri-



gh voltage cabinet in GP-30 which is normally sealed is opened to ow newly developed static load control and programming switch.



Unitized control stand combines air brake and locomotive controller in one panel, simplifying locomotive operation for enginemen.

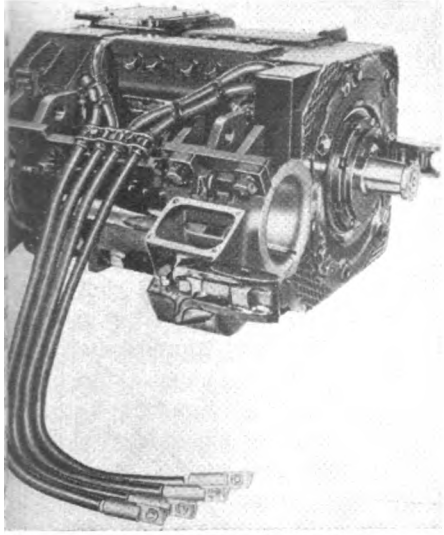
ıtion. Wheel rotation spreads this l in a thin film over the entire face the flange. According to EMD en- neers, this design has already been ıccessfully tested on freight, passen- er, and road switching locomotives.

The electrical controls system for ıe GP30 includes three principal in- ovations: static main generator exci- ıtion; a programming switch for mak- ıg traction motor connections, and ual-purpose feedback power control. 'he static excitation system for the)22 main generator utilizes a mag- etic amplifier to regulate current for he generator's separately excited field. t makes possible fast loading of the nain generator for switching opera- ions. A-C current, supplied by the)-14 alternator, is rectified for main generator excitation. D-c current for this excitation has previously come from the auxiliary d-c generator through the load regulator, a large heavy-duty rheostat. In the new system, a 3-in. rheostat performs this function.

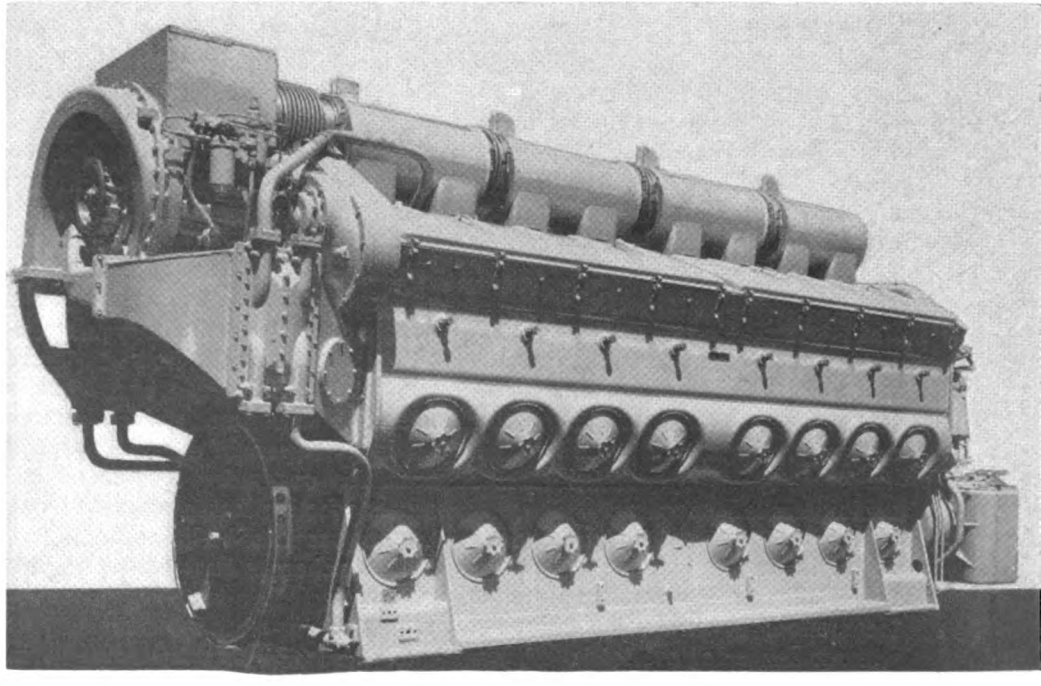
Increased main-generator excitation is necssary to produce the higher horsepower output. Upper limit for the alternator is 170 volts as compared with the 74-volt limit of the auxiliary generator. The alternator can deliver 55 amp through the separately excited main generator field on a continuous basis.

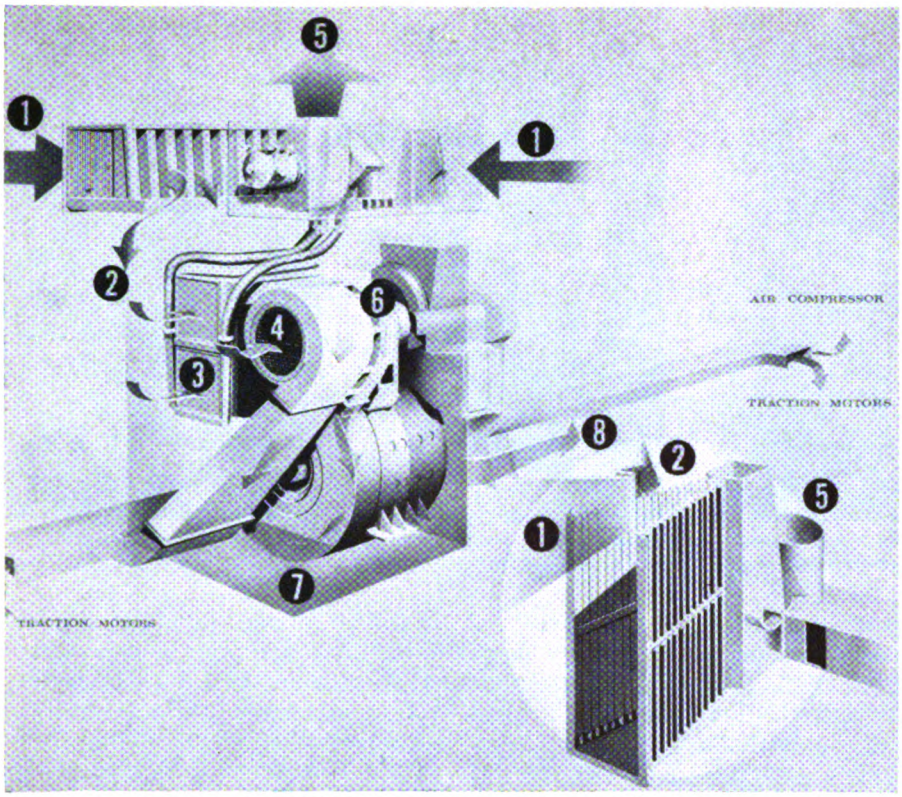
In addition to the increased excitation range, static-load-control limitation of tractive effort at lower speeds is said to produce faster response to wheel slips and quicker recovery afterward. Eliminated is the time lag involved in having the load regulator away from and back to its full-load position. This should reduce wheel slip and make for more effective use of tractive effort than would be possible with constant limiting of horsepower.

With the static control system, dynamic braking effort has been increased 30% by placing the brake limiting regulator in the low-power drive circuit of the magnetic amplifier. This circuit requires only 50 milliamps, or 1/30 the current previously needed. The regulator was formerly in the shunt field circuit, drawing 1.5 amp. The change makes it possible to increase generator output from 600 to



High capacity D-57 motor has greater current rating because of advancements in insulation processing and changes in design and assembly of mechanical components. Prime mover is latest model of 16-cylinder 567-D3 turbocharged engine originally introduced two years ago.





Outside air enters central air filtering system (1) and is cleaned in inertial separator. Clean air (2) then passes into secondary filter (3) and to blower (4) which delivers it to traction motors and air compressor. Dirt is discharged out top of locomotive (5). Generator blower (6) supplies cooling air for main generator; this is discharged into partitioned engineroom (7) where it acts to pressurize this compartment (8), excluding dirt and snow.

975 amp, increasing traction-motor excitation. Engine speed is raised from 435 to 595 rpm during braking to provide added traction-motor cooling. Brake grid resistance has been increased from 0.66 to 0.86 ohm.

The magnetic amplifier and load regulator rheostat are simpler in construction and require substantially less maintenance and less power than the load regulator previously used. The rheostat requires 75 milliamps as compared with the 45 to 60 amp for the conventional load regulator.

The new programming switch is motor driven and cam operated. It makes possible six motor field shunting steps using only three contactors, separately or in combination, rather than the six contactors formerly used. The programming switch is driven by a high-speed, low-power motor geared down at the cam drum. The switch moves through 36 deg for each transition position. Because transition steps are programmed immediately when the switch comes to a position, there is a minimum loss of power.

The dual-purpose feedback power control makes it possible to operate the GP30 with the older, less powerful locomotives in any combination or without danger of overloads. A by-product is the marked improvement in adhesion for drag loads on ruling grades. Rated horsepower is also obtained even when operating at high ambient temperatures when the weight of the fuel per unit volume is lower than normal. Conversely, the feedback control provides protection against excessive horsepower under extremely favorable conditions.

The control consists of two transductors in a magnetic amplifier circuit, one of which supplies a feedback signal proportional to traction generator voltage, and another supplying a feedback signal proportional to traction motor amperage. These signals are added and compared with the 74-volt output of the auxiliary generator. When the sum of the two feedback signals exceeds the auxiliary generator voltage, current in the separately excited generator field is limited. There are two transductor settings. One is operative when the traction motors are in series-parallel during low-speed operation on grades; the second becomes effective during shunting when horsepower must be limited.

Other changes in the electrical apparatus include a push-button emergency fuel cut-off which stops the fuel pump and energizes a stop valve in the governor, and alteration of the fuel pump motor connection so it across the auxiliary generator wh it will stop immediately if the eng stops. The turbocharger lube-oil pu now starts automatically when the e gine is started, supplying oil to the tu bine bearings immediately. When th engine is shut down, the pump con nues to operate for 15 min to remo heat from the turbine bearings.

The new central air filtering sys eliminates filter maintenance and in creases the efficiency of all locomo tive components that use air, accord ing GM engineers. Engine, gener tor, and traction motors are supplie with clean, oil-free, ambient air unde all operating conditions.

All conventional carbody filters o the locomotive are eliminated, bein replaced by a self-cleaning inertia type filter. Secondary filtration f the engine is provided by a centrifug filter which is also self-cleaning. Th combination eliminates all filter mai tenance, except annual inspections.

The central air system provi pressurized air for the engine roo keeping out snow and dust. There no need for winterization of the loco motive air intake.

Air is admitted at the top of the l comotive on both sides where air borne dirt is at a minimum. The a passes through rows of filters whi separate dirt from the air by inert Engine combustion air receives a se ondary filtering in centrifugal filter Dirt separated by the inertial and ce trifugal filters is forced out throu the roof by a small motor-driven blo er. Clean, cool air for the tracti motors and air compressor is suppli through ducts by a mechanical blowe

A blower provides filtered ventil tion for the main generator. Becau the engineroom is partitioned at th generator, air coming out of the ge erator serves to pressurize the engi compartment. Clean, ambient air i also supplied to the sealed high-vo age cabinet, assuring dust-free oper tion of its electrical components.

Clean air for traction motors an air compressor is supplied throug ducts by a second mechanical blow driven from the engine crankshaf This blower replaces the four separa traction-motor blowers with the se motor drives used on previous loco motives.

The pressurized cooling system i

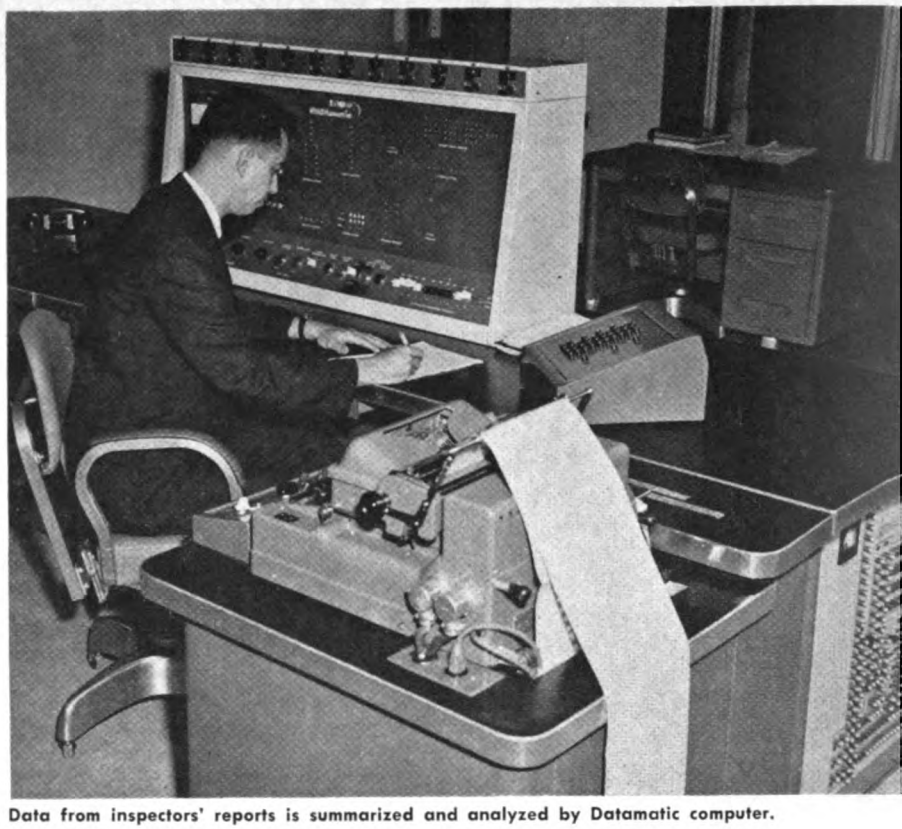
(Continued on page 36)



Inspection produces complete report of car's condition.



lass of repair required is indicated by shopped car card.



Data from inspectors' reports is summarized and analyzed by Datamatic computer.

Computer Keeps B&O Car Repair Data

A major freight-car repair program which Baltimore & Ohio President Jervis Langdon, Jr., calls "the key to B&O's future" has just moved into full operation at five of the road's car shops. Intended to repair selectively the accumulation of unserviceable B&O cars and cars currently becoming unserviceable so that the road can be assured an adequate car supply for future needs, the program represents coordination of efforts by the Mechanical, Operating, Finance, Methods Research, and Data Processing departments. The large quantity of data needed to implement this extensive repair program is accumulated and tabulated by the road's Datamatic computer.

The plan is expected to provide the railroad with an adequate car supply to recapture business. It should also reduce the heavy per diem costs involved in using foreign line cars in place of unserviceable B&O-owned equipment. It is also expected to produce savings which mass car repair, on a regularly scheduled basis, can make possible.

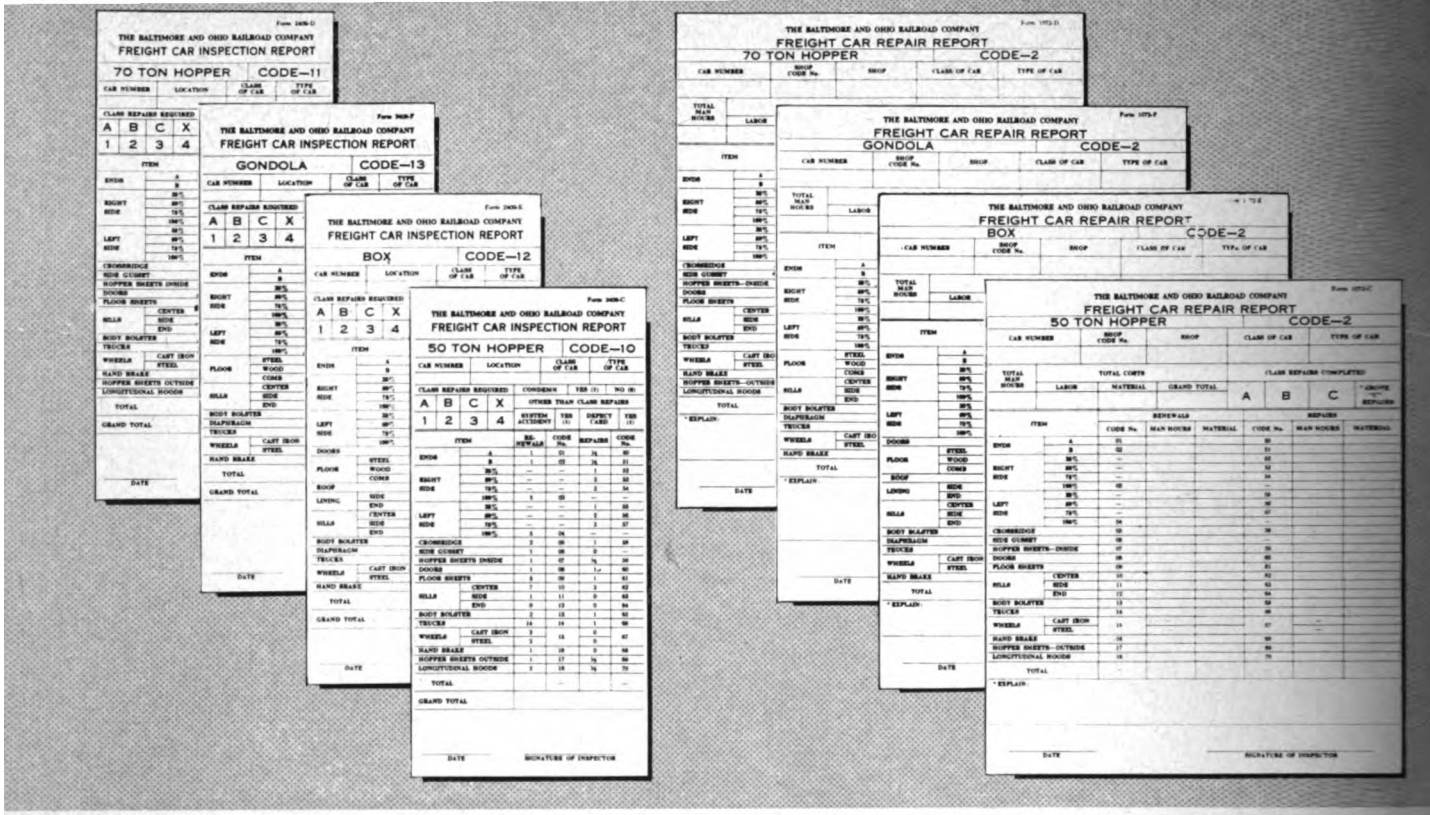
Utilization of the latest electronic data-processing techniques gives the B&O a complete and current record of its bad-order cars, indicating their location, estimated repair cost and materials required for these repairs. Necessary materials for each car flow to the proper shop locations on a coordinated basis, timed to coincide with the car's arrival.



Completion of repairs on car is followed by report of all labor and materials involved.

"What we want is the maximum number of serviceable cars at minimum cost," a B&O spokesman explained as the program got underway in October. Studies have indicated that savings realized from the new cost controls and mechanical methods should minimize car repair expense. The computer is analyzing data compiled by car inspectors and cost engineers, insuring that the road gets a maximum return on every repair dollar spent.

Depressed traffic levels of recent years have curtailed B&O freight-car maintenance. Earlier this year President Langdon decided that the bad-order ratio could not be permitted to



Freight-car inspection reports (left) are completed by inspectors while going over the cars. Freight-car repair reports (right) are made at shop; computer compares actual results with the estimates based on inspectors' reports. All data goes on magnetic tape for computer.



Data from inspector's reports is transferred to punch cards; later it is put on the tape.



Materials and man-hours are estimated in advance for all cars coming in for repairs.

grow any larger. The program has been worked out not only to bring the freight-car fleet back into good condition, but to keep it there.

Computer records of unserviceable cars are kept current by adding cars when reported by inspectors. Every car is scheduled for repair on the basis of whether its estimated future service life justifies the cost. Three additional service-free years will be the minimum acceptable for most repairs. In initial stages of the program, two streams of cars will be flowing to B&O shops—those having just become unserviceable and others selected from the accumulation of bad orders now stored all over the B&O system.

Currently, there are about 21,000 of the road's 87,000 cars rated as unsuitable for service. Detailed information on nearly all these was gathered during July and early August when a "small army" of B&O car inspectors combed the system, giving each car a complete inspection. More than 100 car inspectors using specially prepared forms indicated whether each car inspected should be dismantled or repaired, and the types of repairs needed.

On the basis of this experience, specially designed report forms have become a permanent part of car inspector's equipment. There are four types of these inspection forms covering the four principal types of cars owned: 50-ton hopper, 70-ton hopper, box car, and gondola.

The reports when filled out, contain the following information:

- Car number.
- Location.
- Class and type of car.
- Was car damaged in system accident?
- Was car damaged in off-line accident?
- Does inspector recommend condemnation of car?
- Specific repairs required.
- Specific renewals required.
- Index number summarizing renewal and repair items required.
- Class of repair based on index number.

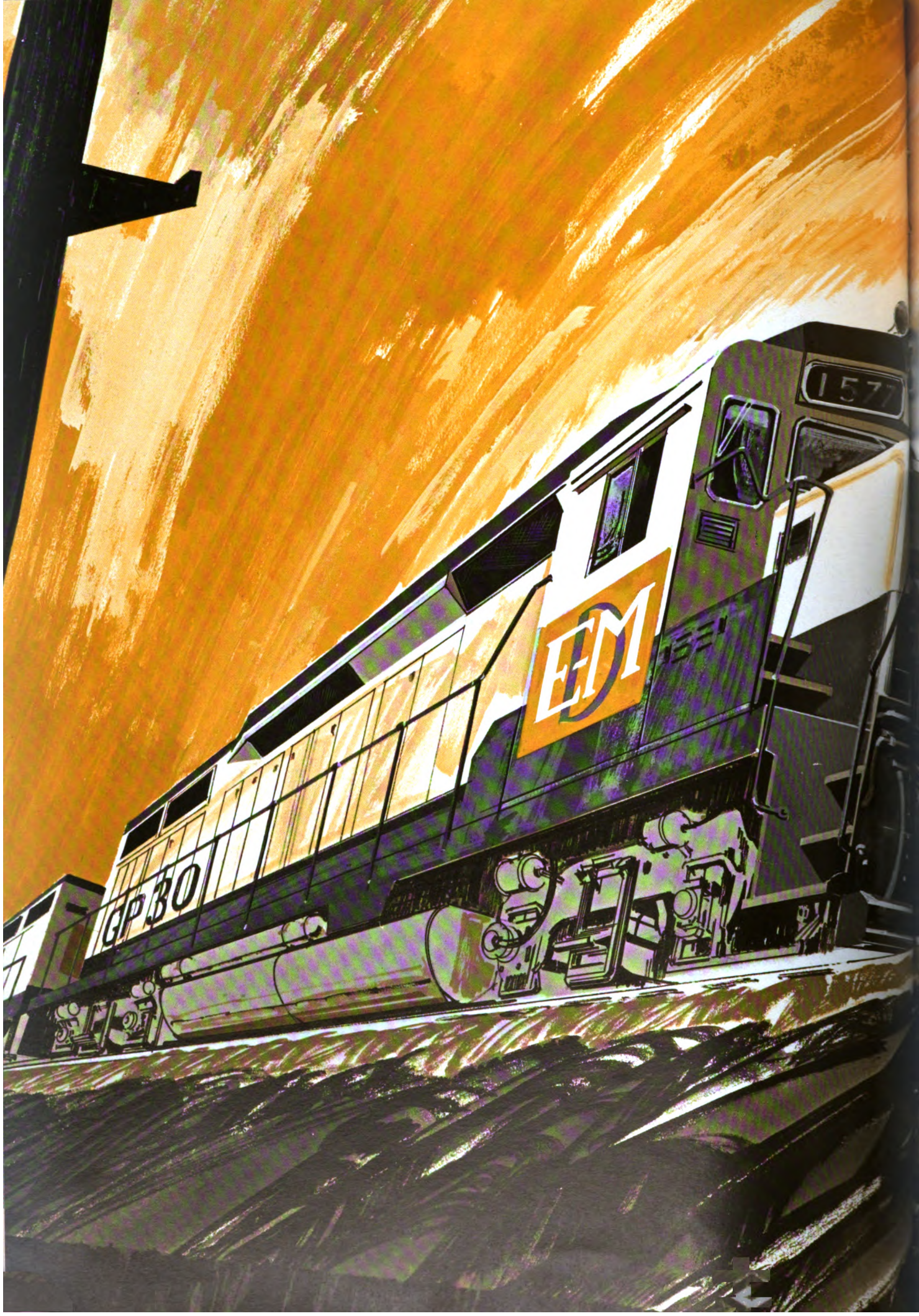
The reports are designed to determine immediately the class of repairs required and to facilitate analysis of car repair requirements by mechanized data processing.

Opposite each defect item listed there is a figure in the renewal and repair columns. When a defect is recorded, the figure opposite the item in either the renewal or the repair column is circled, depending on which is required. When all items to be renewed or repaired have been circled, the circled figures in each column are added. Finally, the two column totals are added together, producing a grand total.

(Continued on page 28)



GENERAL MOTORS ANNOUNCES . . .


157
EM
GP 30



The Revolutionary GENERAL MOTORS GP-30

A new broad-range, unit-reducing mainline locomotive . . . twenty-two hundred and fifty working horsepower . . . a major contribution from Electro-Motive research and product development . . . creating the profit making advantages of lower maintenance, higher reliability, broad-range performance . . . moving more gross ton miles per freight train hour at lower operating cost than any Diesel-electric locomotive ever put on the rails . . . anytime, anywhere.

This is the Revolutionary GP-30 . . . a new pace setter for America's railroads.

Computer Keeps B&O Car Repair Data

(Continued from page 22)

The class of repairs (A, B, C or X) required for each car will be determined by the figure in the Grand Total space—for instance, a total of less than 5 will rate the car in the A category; a total over 5 puts the car in the B classification, and still higher totals classify it either in C or X.

When the class of repairs has been determined, the appropriate letter under Class of Repairs on the inspection report is circled. A Shopped Car Card is then applied to both sides of the car, folding so as to display only the letter representing the class of repairs to be made. Original of inspection report, which is made in triplicate, is sent immediately to the Mechanical Department in Baltimore. The first copy is kept at the reporting station; the second is placed in the defect card holder on the car.

As the results of last summer's system-wide inspection came in to the mechanical department, cost engineers analyzed them, estimating wage and material costs involved in repairing the cars. They also estimated the number of serviceable years that might be expected from each repaired car, based on its type, age, and condition.

Because of the vast amount of work in putting this information in usable form for study and analysis, it was decided to turn the job over to the railroad's Datamatic computer. Data was put on punch cards for conversion to magnetic tape records used in computer processing.

From the mechanized data obtained in this process, three significant reports were produced: one showing estimated costs and man-hours involved to repair each of the thousands of cars inspected—by individual car number, by class and type of car, and broken down into various ranges of repair cost in ascending order of expense. A second report provided a complete list of repair and renewal items needed for each car so that material requirements could be determined. A third showed the location of every unserviceable car on the system. Each of these statements is summarized in various ways on the computer to facilitate analysis.

Analysis of the three basic reports produced by the computer showed that by grouping cars for repair, according to certain repair cost categories, B&O's needs for the immediate future could be met and a feasible repair program to produce required cars of various types projected.

Hoppers are repaired in the company's shops at DuBois, Pa., and Keyser, W. Va.; gondolas at Glenwood, Pa.; box cars at Washington, Ind., and Brunswick, Md. Other shops may be utilized as the program progresses.

Obviously, such a plan has called for a vast amount of coordination between departments in order to establish production schedules, arrange for material deliveries, and provide for movement of cars to shops so that all phases of the operation will fit together as a workable whole. The program is being refined and improved as work progresses. Immediately responsible for the plan is W. J. Dixon, industrial engineer. Reporting to C. E. Bertrand, vice president-operation and maintenance, he works closely with F. B. Rykoskey, chief mechanical officer, and W. A. Mullen, superintendent car department.

Shop Procedures

In B&O shops there is now no special emphasis on repairing a single class of car at one time. This means, for instance, that there may be several different types of box cars on a repair line simultaneously. They will, however, all require the class of repairs called for by the production schedule, even though this may not involve the renewal or repair of the same components on every car.

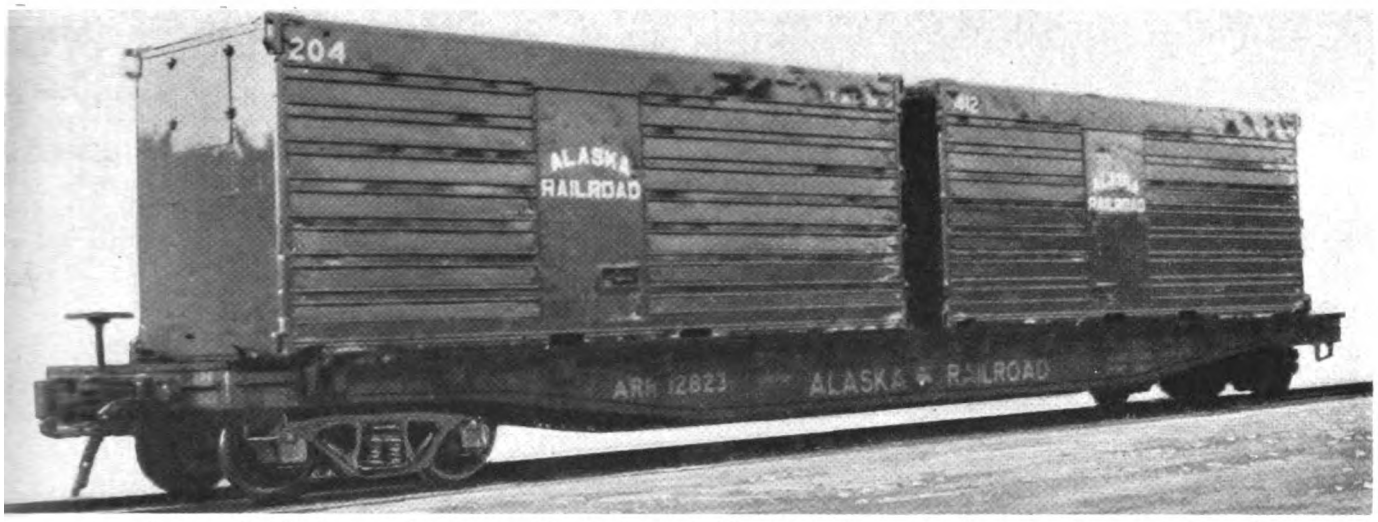
In conjunction with this program, the Mechanical Department is introducing design improvements in many cars. Box-car body bolsters are being strengthened and hopper cars are being fitted with heavier top side angles. Gondolas are being equipped with improved ends.

The material requirements for each of the different repair operations have been worked out very carefully. For example, suppose a car, when inspected, is found to require repair to both ends and to floors, sheets, center sill and trucks, as well as renewal of crossridges, side gussets, hopper sheets, and doors. The summarization of this type of information by the Datamatic computer for each class of car permits computation of detailed material requirements in terms of steel plates, angles, and rivets for the cars.

The material and man-hour figures are based on experience with past repair programs and will be adjusted, if necessary, as the new program continues. In addition to the three preliminary reports produced weekly by the computer, a fourth tabulation, also weekly, has been added, based on reports produced by cost study engineers at each of the repair shops. As each car comes off the repair line, an individual Freight Car Repair Report is made showing the cost of materials actually used on the car and the total man-hours expended. This information, which is compiled from detailed work sheets designed for that purpose, is key punched and transferred to magnetic tape in the Data Processing Center. Here it is used to produce a record showing a comparison between the preliminary estimate of man-hours and materials and the actual figures for each car repaired. With this car repair analysis, it will be possible to check inspection quality, review material requirements to avoid waste, and to develop more accurate cost figures. This "feedback" is expected to be an important benefit resulting from the use of the computer.

Class X cars, or cars recommended for condemnation by inspectors are not being repaired during the first phase of the program. Serviceable cars are available at much lower cost presently by processing the A, B, and C cars. For this reason, one of the important tabulations prepared by the computer is that showing cars ranked in order of estimated total cost of repairs. As experience is gained with the new system, decisions will be made later as to which, if any, Class X cars will be repaired. Cars will not be automatically scrapped on the basis of the car inspector's classification; they will be reinspected by supervisors before a final decision is made on their disposition.

The computer program now involves only box cars, gondolas, and 50- and 70-ton hoppers. These cars make up only a few of the 21,000 bad-order cars which the B&O has. Summaries of the bad-order situation indicated the following unserviceable cars: 5,500 box cars, 3,300 gondolas, and 12,500 hoppers. A large proportion of these are in the X classification and will either be retired or repaired later.



Containers used by Alaska vary. Some are fitted for heating and refrigeration; others only for heating, and some only for cooling.

Power Car Used for Alaska Piggyback

Containers loaded with perishables are moved over the Alaska Railroad on special flat cars equipped with electric trainlines from which the refrigerating and heating equipment on the containers can be powered enroute. Electric current generated on a power car is fed to the container cars through a 200-amp trainline.

Containerized perishables are handled by ship from Seattle and San Francisco to the southern terminal of the Alaska at Seward. Containers are then transferred to railroad cars for movement to various points along the 470-mile main line extending through Anchorage to Fairbanks. At destinations the railroad delivers containers to consignees using its own tractor-trailer equipment.

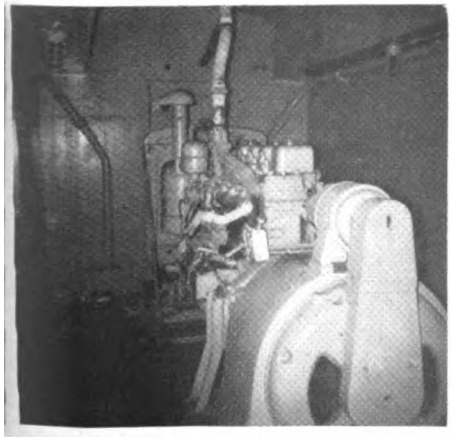
Cuts of container flat cars are accompanied by one of the Alaska's power cars when in trains. While the power car operates unattended, it does have warning lights mounted about 18 in. above the car's roof where they are visible to train crews. If an engine or generator should fail, a relay closes to complete a circuit from the 12-volt battery to the warning lights. This indication makes it possible for the crews to take action to prevent spoilage of the perishable ladings.

Cargo containers have a capacity of 1,100 cu ft and 50,000 lb. They are fitted with heating and refrigeration units like those used by other container operators. Each of the 53 ft 6 in. flat cars has deck-mounted chock blocks which hold two of the 24-ft containers.

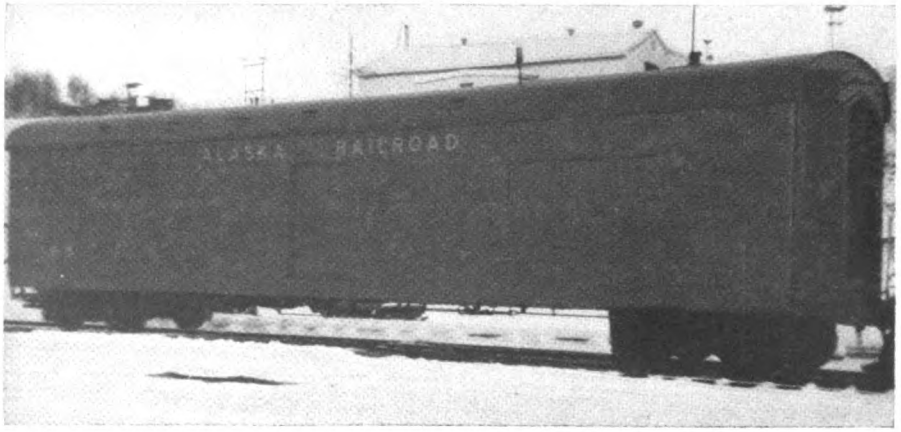
A typical power car, a rebuilt World War II kitchen car, is equipped with a pair of diesel-driven alternators. The car shown carries one 150 kw Caterpillar Model D-337 and one 75 kw Caterpillar Model D-13000. The 650 gal fuel tank is installed inside the car, between the two generator sets.

Current generated is three phase, 60-cycle, 120 volt. Flat cars have 2 in. conduit attached to the underframes and extending from end to end, carrying the three 2/0 power cables and a No. 4 grounding conductor. There is a 200 amp receptacle at each end of each car adjacent to the angle cock. Each car is also equipped with three receptacles, one at the center and the others at diagonal corners of the car into which jumpers from the container refrigeration and heating units can be plugged. These cables have 20-amp ratings.

Because there is no car interchange, trainlining of Alaska piggyback cars presents no operating problems.

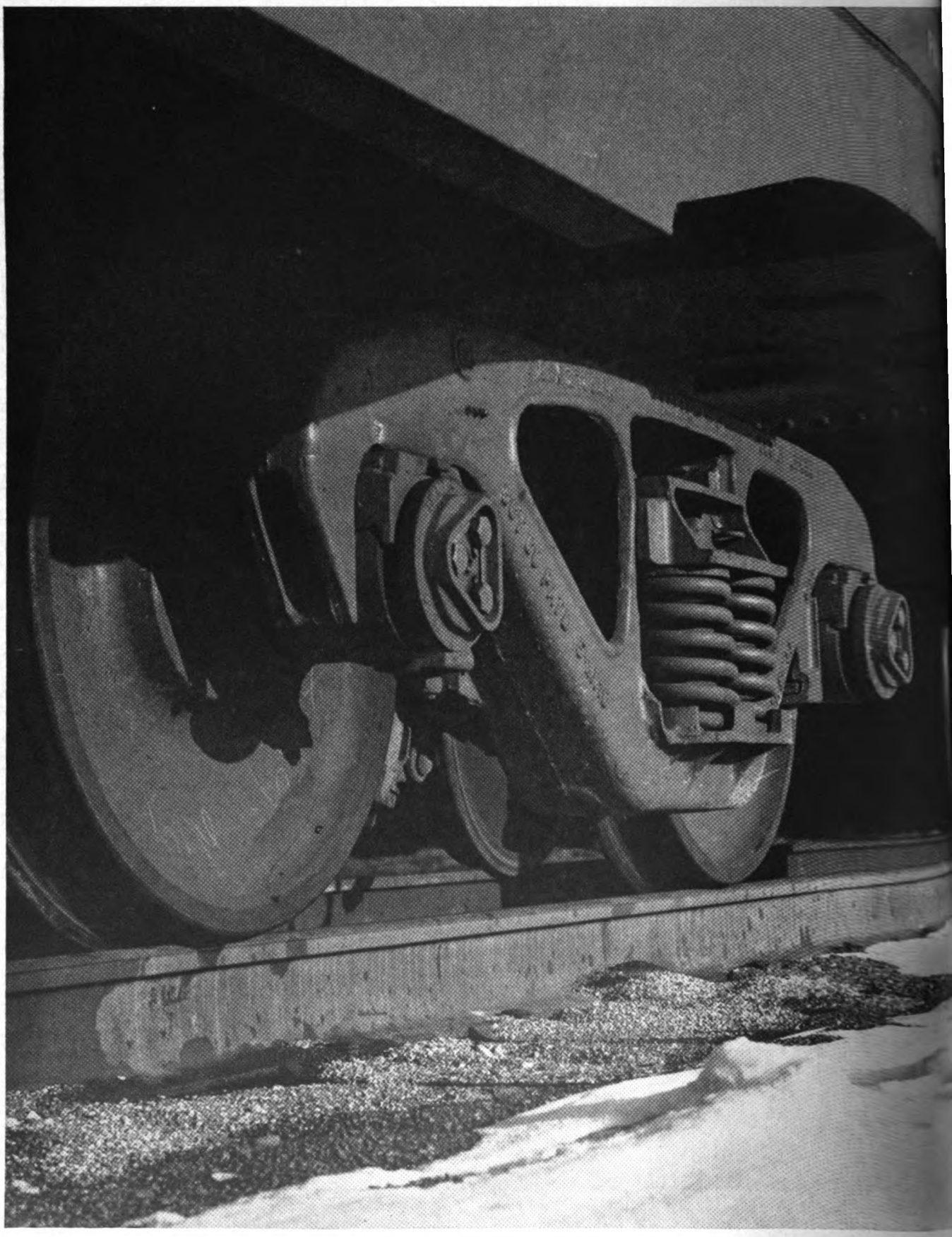


Diesel alternators are mounted over the trucks at both ends of the power cars.



Power cars are fitted with trainline receptacles at both ends through which current is fed to container flat cars. Cars are designed to be operated without attention en route.

What's the score o



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HEAVY DUTY SERVICE

Records of one railroad show that Timken bearings have rolled heavily-loaded cars over 600,000,000 miles with only three overheated bearings. Compare this to any other bearing's performance.

LUBRICANT

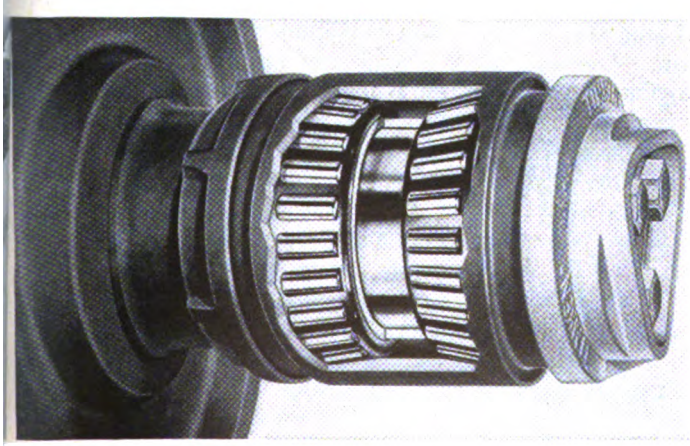
On one railroad's high-speed, high-mileage cars, Timken bearings rolled 288,000 miles without addition of lubricant —kept right on rolling. Compare this to any other bearing lubrication records.

GROWTH

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Don't Go Looking for Trouble

By Ken Wright

Even though many more mechanical refrigerator cars were in service, the number of failures seemed to be going down steadily. The men in Big Jim's shop frequently discussed this. Some said it was because of better maintenance; others believe that better engineering and improved construction were responsible. One fellow suggested that, perhaps, because there were so many more cars, there was a great deal less tinkering. Probably it was a combination of all these factors which was producing the successful operation. Not all failures had been eliminated and sometimes the new developments, themselves, were responsible for confusion and delays.

All this made Pete unhappy; he was forced to spend more and more time on routine work. In addition, he had done such a good job of training his fellow workmen that now they had very few occassions to call on him for assistance. One afternoon while several cars were being prepared for service, Chuck came over to Pete and said: "I've got a strange one over there; the compressor on that car won't stop unless the thermostat is turned up. It puzzles me because everything seems to be all right."

Pete turned. "How many times have I told you that the proper nomenclature is temperature control, not thermostat," he asked. "You should use the proper terms to prevent misunderstanding. If your report concerning a defective thermostat is not clear, someone may think it is the thermostat in the engine cooling system, not the temperature control for the entire car. Well, let's go see what the trouble is."

As they approached the car, Pete said: "What's the setting on the temperature control?"

"The car is going to be loaded with chewing gum and they want a 35-deg temperature. You can see both from the test thermometer and the car's own thermometer that the temperature is 35 deg. However, the compressor is still running, and I'm afraid the temperature will continue to drop. Why doesn't the compressor stop when the temperature control setting is reached?"

A glance at the car's reporting marks told Pete that it was part of a rather extensive fleet. He didn't, however, recognize the car number and assumed that it was be a reasonably new model. Subsequent events proved this to be the case.

Pete climbed into the machinery compartment, gave the engine a quick glance, and turned to the compressor. The car had a single compressor. This was unusual, because most of the cars previously operated by this car line had dual-compressor refrigeration systems.

Pete felt the compressor cylinder heads. "Did you feel these heads, Chuck?"

"Sure; two of them are hot and two are cold. What does that mean?"

Pete looked a bit disturbed, and then said: "It means that two of the cylinders are loaded and the other two are unloaded. This compressor is only working at half capacity. Has it operated this way ever since you started the car, or did the control system unload the two cylinders?"

"I'm sorry, Pete, I don't know," Chuck replied. "When I started the engine, I did notice that the compressor started but didn't check to see if all of the cylinders were loaded. As a matter of fact, I forgot that you could make this sort of check. I remember now that cylinders which are loading will be hot because of the compression which is taking place in them. I do know that the car started to cool down immediately and didn't think that anything was wrong until its temperature got near the setting. When the compressor failed to stop, that's when I came to get you."

In the meantime, Pete had opened the electrical cabinet and was looking at the wiring diagram. "Look at the governor on the engine and see if there's anything unusual about it."

"Not a thing," replied Chuck. "What's that got to do with our problem?"

"Let's go outside where it's easier to talk," replied Pete.

As they climbed down from the car's machinery compartment, two of their fellow workmen were passing by. When they saw Pete and Chuck, they thought something unusual was probably taking place. Not wanting to miss a trouble-shooting session, they stopped to listen. Quickly Chuck explained his problem and then turned to Pete for an explanation.

"First we must realize that this is a fairly new car," Pete began. "The control system incorporates later developments than those with which we are familiar. That wiring diagram in the control cabinet was a little confusing when I first looked at it. It develops that the owner uses the same wiring diagram to cover two different arrangements.

"A refrigeration system moves heat. That is old stuff to us, of course, because we have gone into it many times before. When we have a large quantity of heat to remove from a car, there is a great deal of work to be done, and a lot of power will be required to do it. If it's a hot day, the removal of this heat will mean a still greater work load. As the temperature of the car interior is lowered, however, there is less work to be done.

"Designers finally asked themselves why an engine should run at top speed if full horsepower is not required. Same thing applies to electric motors. Why should they operate at full speed unless maximum output is required. By reducing the speed of these components, it was thought it might be possible to reduce wear on bearings and other moving parts. On some cars they have now gone to two-speed operation. During the initial pull-down or cooling of a warm car, the engine operates at high speed and produces 60-cycle alternating current. When the temperature approaches the car temperature-control setting, engine speed is reduced so that 40-cycle power is produced. This means that the motors then operate at two-thirds of their maximum speed.

"Wait a minute Pete," asked one of the fellows who had stopped to listen. "Wouldn't operation on the lower frequency cause these motors to overheat?"

"Normally that would be true," Pete answered. "However, the alternators are designed so that their voltage drops in direct proportion to the lower frequency. This means that there is no motor overheating.

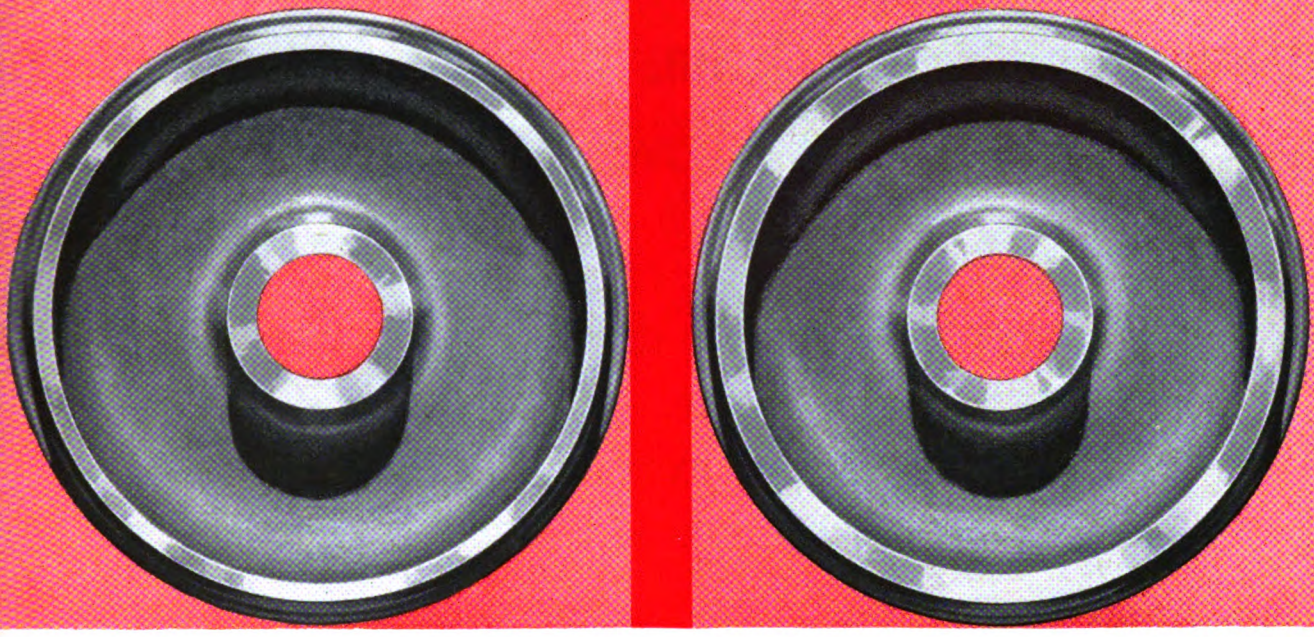
"Now, where was I? Oh yes; at the

(Continued on page 36)

This is the eighteenth article in this series discussing the operation, maintenance and trouble shooting of mechanical refrigerator cars.

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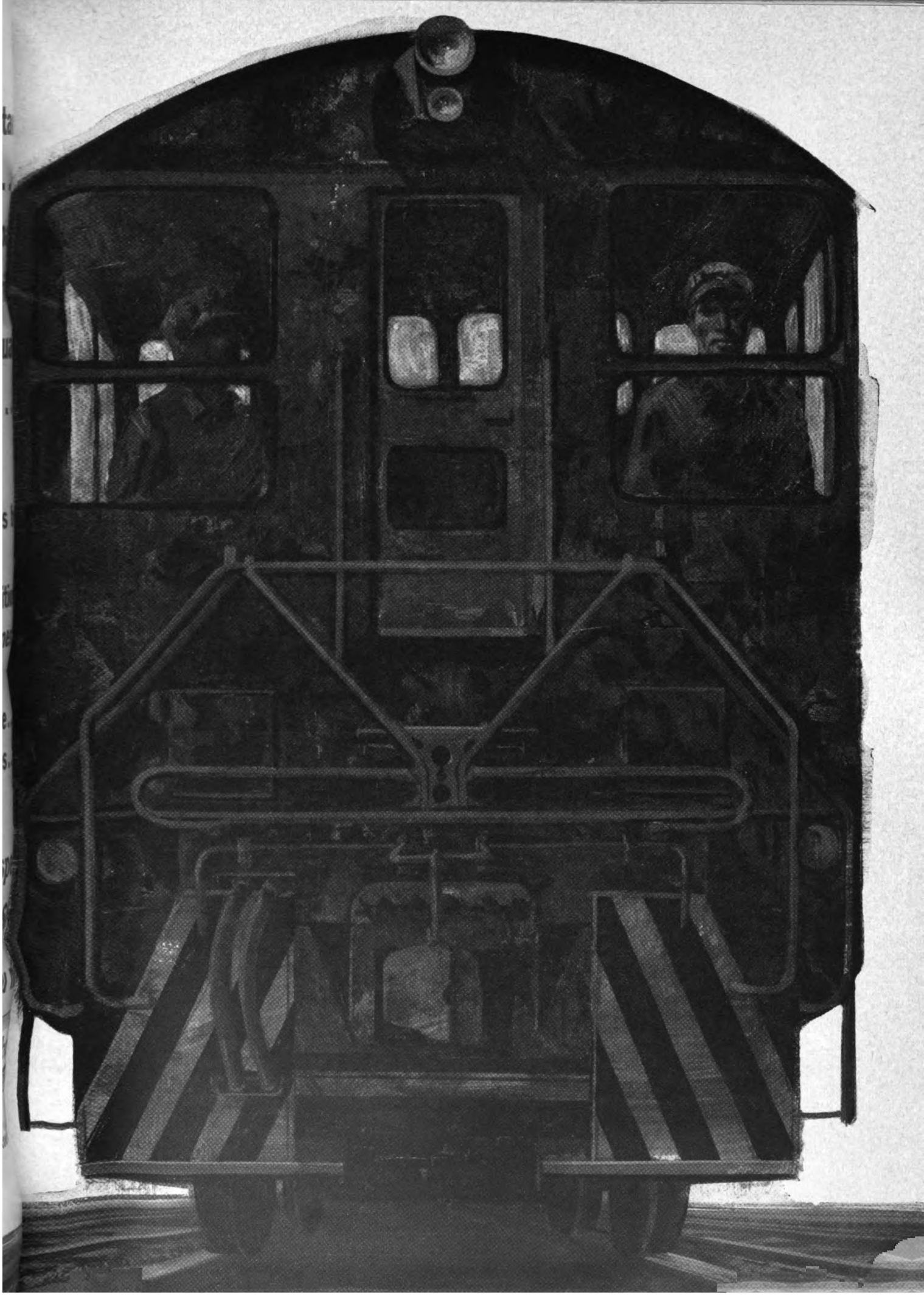
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(Continued from page 32)

same time the engine speed is reduced, the compressor is partly unloaded. This, therefore, reduces power requirements. Under average conditions, this operation will continue and hold the car temperature very uniform. If the temperature were to continue to drop so that it finally went below the temperature setting, the compressor would stop. However, the engine would still continue to run at reduced speed.

"When I checked the wiring diagram, I determined that this car does not have the two-speed engine arrangement. However, it does incorporate the partial unloading of the compressors. In short, the symptoms that were bothering you, Chuck, were really evidences of normal operation."

"That clears up something else for me too," Chuck replied.

"What was that?"

"I could only wonder, before I came over to get you, why the car's temperature was so steady. Any changes were so slight that I could not detect them."

"Like a lot of other fellows, Chuck, you have a tendency to imagine that you are incurring trouble when, in reality, there is nothing wrong."

The fourth fellow who, until now, had said nothing, spoke up. "Pete, don't all of the extra controls needed to produce this two-speed operation and compressor unloading really create additional places where trou can occur? It seems to me that put in more controls is really asking trouble. What are the advantag

"I'm not sure of the actual figur replied Pete, "but I do remember a 25% fuel saving could be expe with the two-speed operation. In dition, there should be reduction wear and tear on the engine and o components. These would be hard evaluate accurately. At any rate, th should be some increase in their ser ice life."

Suddenly Pete stopped. "Here have been talking again and soon Jim will want to know why that job mine isn't done."

"Wait a minute, Pete," Chuck s "Should I check to see that all of t compressor cylinders will load?"

"To satisfy yourself, you probab should," Pete said as he turned to g "You did not think that it took t long to bring the car's temperatu down, so I would be willing to bet th you did have full capacity with all fo cylinders operating during that pull down period. All you need to do no is to turn the temperature control a lower setting and all of the cylinde heads should begin to heat as the com pressor again begins to operate at fu capacity."

As he turned away, they heard Pet muttering, "Spent all that time an there wasn't a darn thing wrong."

General Motors GP-30

(Continued from page 17)

sures cooling water flow under high temperature conditions which can develop during tunnel operation, or when radiators may be clogged or shutters partially closed. A pressure relief cap permits cooling system pressure to build up to approximately 3 psi as the water is heated to operating temperature. This raises the boiling point of the water 8 to 12 deg F at the water pump inlet, assuring positive water flow at the higher operating temperatures. Evaporation losses are reduced so that refilling and addition of water treatment is practically eliminated.

Like most recently built road switchers, the new GP30 has the low-profile, short hood ahead of the cab. In the cab is a new unitized control stand, which has been specially developed for this locomotive. Combining the air brake and locomotive controls in one panel, it is intended to simplify locomotive operation for enginemen.

"An important economic feature of the new locomotive is the fact that it can be purchased through Electro-Motive's Locomotive Replacement Plan, with savings to the railroad customers," Mr. Terrell told railroaders gathered at Warren. He said that the plan, under which railroads turn in 12- to 16-year old 1,500-hp GM units so that certain long-life parts may be re-manufactured and incorporated in a replacement locomotive can offer excellent return on investment. "The reason that certain long-life pieces can be reused," he explained, "is due to the long-established engineering policy at Electro-Motive which requires that all improvements in components must be applicable to earlier models. This the customer's investment in older motive power has been protected to a degree far beyond that which could logically have been expected at the time of purchase."

Lets one man do the work of three!



The built-in hypocycloid gear is the power secret! Free to follow the eccentric crankshaft, but not free to rotate itself, it produces a 6:1 reduction ratio.

*Pending

NEW! Wine Power Geared* Discharge Gate

N UNDER A 70-TON LOAD one man can open this gate. Accurately machined mating surfaces provide free operation and a tighter seal. No more sledging ır damage in attempts to open "frozen" hopper doors. :ric steel castings eliminate distortion.

CISION-MESHED GEARS without costly machining! zingly accurate shell molding process helps keep unit ıetitively priced despite *Power-Gear* features. Rack-and- n principle assures parallel operation without side bind- All bearing surfaces are lubricated with Moly Disulfide.

COMPLETELY PREASSEMBLED for easy installation, ready for welding. No further fitting, no extra parts required during assembly of car. 13x24" opening fits most standard chutes. Interchangeable with most present gates; equipped with standard boot groove. Conforms to all recognized unloading devices. Now in service on six major railroads and a car leasing company. •

A TRIAL APPLICATION WILL CONVINCE YOU! Complete specifications and application data on request.

WINE
Railway Appliances

WINE Railway Appliances by UNITCAST CORPORATION • TOLEDO 9, OHIO



Spectrometer at Cleveland Research Center shows that wear in locomotives using Talona RS Oil 40 is negligible. Lab technician in foreground prepares samples.



Amazing performance record of Talona RS Oil 40 was set up in EMD diesel locomotives. Oil was used on heavy-duty freight operations.

LUBRICATION:

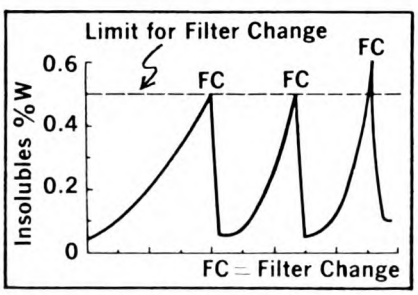
"After 316,000 miles of heavy-duty use, Shell's Talona RS Oil 40 still does not need draining," reports the New York Central

The New York Central Railroad system has just completed its latest monthly check on Talona RS Oil 40 – after the oil had been in use 316,000 miles.

The railroad's lubrication experts report that the oil is still in sound condition, and satisfactory for continued use.

Read how Talona® RS Oil 40 can help trim your operating costs.

LOCOMOTIVES that used to need an oil change every 50,000 miles now run 300,000 miles and more between drains. The reason: Shell Talona RS Oil 40.



Graph shows effective filtration of Talona RS Oil 40 in heavy-duty freight service, using a lower cost fuel. Good filterability helps keep engines clean.

New proof of this oil's outstanding performance has just been disclosed by one of the largest railroads in the United States.

Recently, when New York Central Railroad sent samples of Talona RS Oil 40 to the Cleveland Research Center for testing, the oil had been used on heavy-duty freight operations – for 316,000 miles.

Despite the high mileage, the railroad's lubrication experts could report these amazing results:

> *Insoluble contaminants are still being controlled by filters at safe levels. Spectographic analysis shows that wear is negligible. And there is no excessive thickening of the lubricant.*

The lubrication experts recommended that the oil should be kept in use. And the railroad has extended the drain period indefinitely.

Here are 3 key features of Shell's Talona RS Oil 40 that can help you trim your railroad operating costs:

1. Talona RS Oil 40 has excellent filterability.

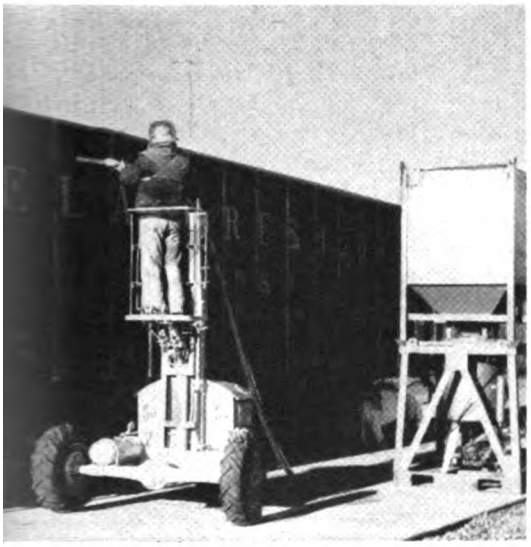
2. Talona RS Oil 40 contains special Shell additives that resist oil oxidation, even in heavy-duty work.

3. Talona RS Oil 40 contains alkaline additives that neutralize acids.

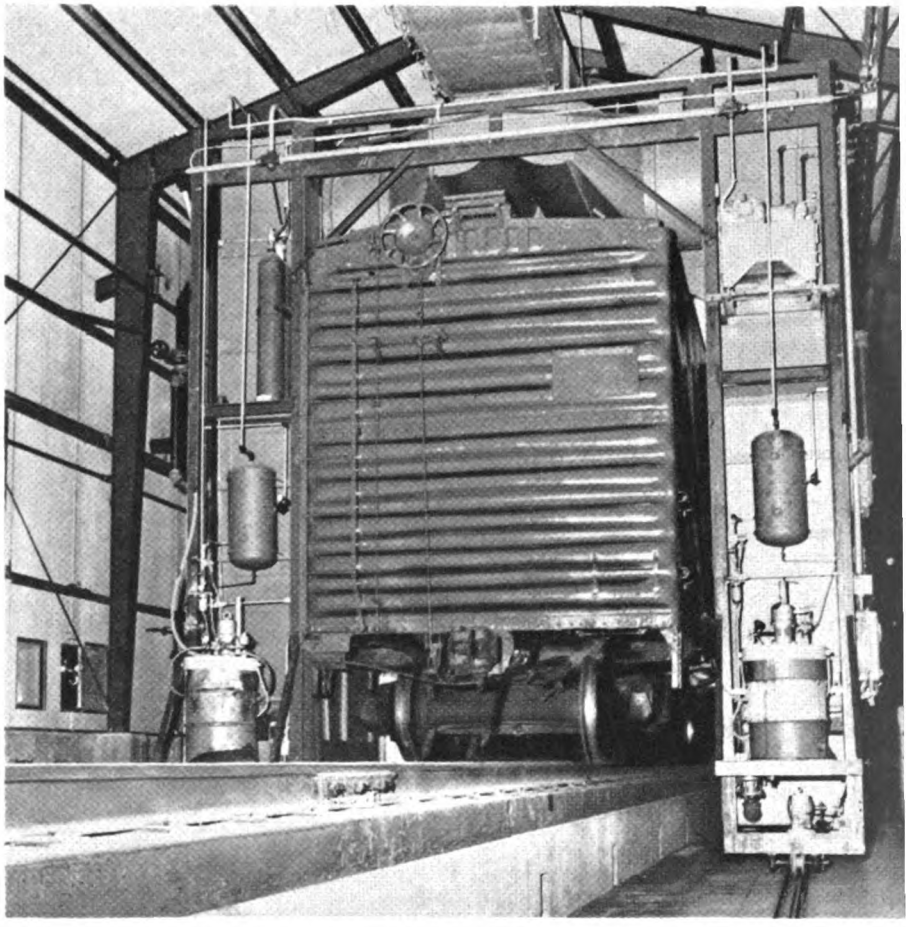
Your Shell Railroad Service Engineer will give you the details. Or write: Shell Oil Company, 50 West 50th Street, New York 20, N. Y.

SHELL

A Bulletin from Shell
– where 1997 scientists are working to provide better products for industry



uirrel," developed for agricultural use, provides a self-rated, adjustable-height platform from which the sand-t operator can prepare cars for painting.



Traveling paint spray booth operates on a 324-ft runway which makes it possible to paint and stencil six cars from booth during a single shift. Track through the shop holds six cars. Large lettering on newly repainted cars will help to develop, according to a D&H officer, "a lively and fresh impression of the vitality of the Delaware & Hudson system."

) & H Has Programmed Car Painting

A painting program that will bring ight cars in to be repainted every th or seventh year has been under-:en by the Delaware & Hudson. ıring 1961 this calls for fresh paint · 1,500 of the road's 10,000 freight :s. To do this on an efficient pro-ction basis, D&H has installed a w paint facility at its Oneonta, N. , car shop. Completed and put in vice in late 1960, the Oneonta fa-ıties now handle six cars a day on ɔne-shift basis.

Fresh paint on D&H freight cars d locomotives is in keeping with a ew look" which the railroad has en striving to achieve. Appearance the road's freight cars is important, cording to J. P. Hiltz, Jr., vice-presi-nt, Operation and Maintenance, ıce it is the freight cars that the blic sees most often, and from them least a part of the public image of ailroad is formed. D&H, which had special facilities for freight-car inting prior to completion of its new op, strived to produce a facility ıich could operate smoothly and efficiently with a minimum work force.

Cars to be painted are placed on storage tracks adjacent to the building. Enough cars are provided to keep the paint shop production line supplied for whatever shifts are being worked. Cars of the same type are selected for one day's operation.

One man is assigned to prepare cars for painting. Using a Whiting Trackmobile, he moves cars from storage track to the sandblasting area on the inbound track.

Clemco sandblasting equipment and a Blackwelder Steel Squirrel are used. The "squirrel," developed for use in



Painting is to continue on a sustained and regular basis at new shop. Only cars of one type are painted at one time. Trackmobile is used for moving cars into and out of shop.

apple orchards, permits the operator in the cage to raise or lower himself to any desired height. The squirrel eliminates the need for platforms in the sandblasting area.

When the cars have been prepared, the Trackmobile is used to move them to the door of the shop. At the end of a day's operation, six cars will be waiting; six will be finished and ready to pull out the other end of the shop to be weighed and returned to service.

The Trackmobile moves the completed cars from the shop and then places the six sandblasted cars inside. Air in the shop is heated. Overnight, this removes all traces of moisture and warms all the metal surfaces so that the one-coat paint spray will adhere properly with uniform and complete coverage.

Inside the 340-ft shop a DeVilbiss traveling spray booth is operated on a 324-ft runway—ample for six 50-ft cars. At the finishing end of the shop a pit 20 ft long and 6 ft deep, equipped with floodlights, is provided for spray-coat, fast-drying paint is applied with Grayco airless spray equipment. Paint is not heated prior to application.
ing under portion of cars. The one-

Spraying Operation

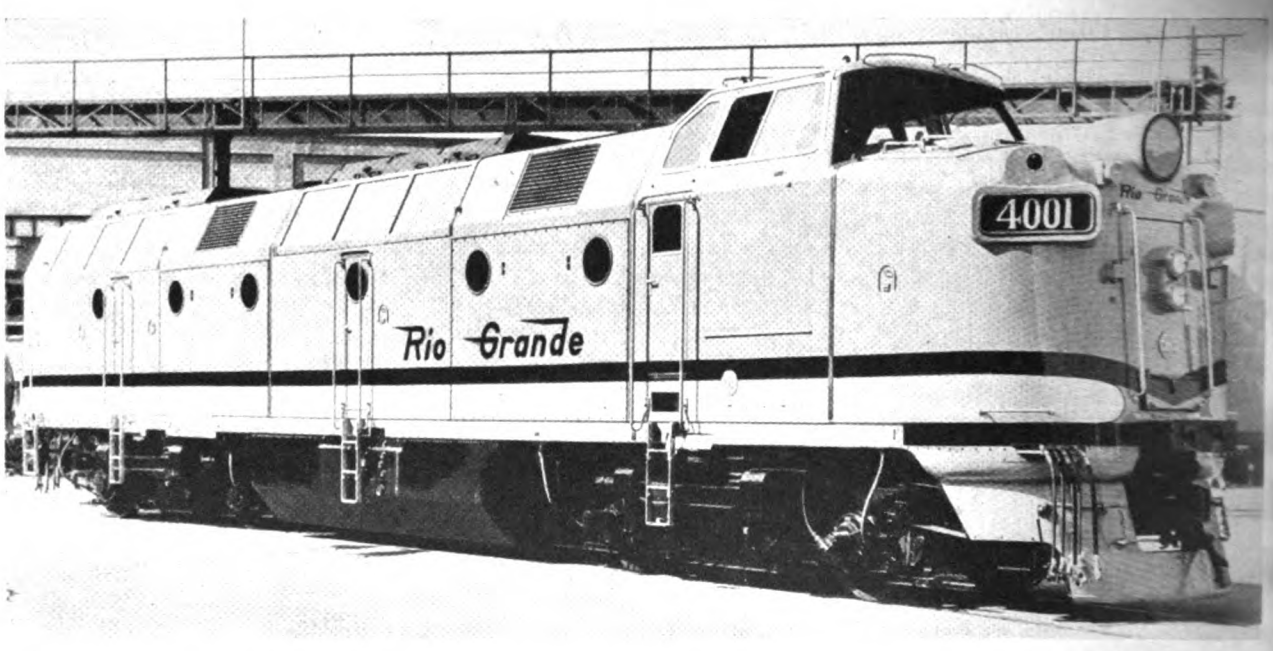
Spraying is done by two painters—one on each side of the booth. One paints a side and the lower portion of the ends. The other does the opposite side and the upper ends. The booth is arranged so these painters can also do the underbody and trucks. The booth travels at 22 ft per min, requiring under 15 min to pass the six cars. D&H is experimenting with a 4-mil paint thickness, expecting it to last six to seven years. Experience may later lead to a change in this thickness.

By the time the booth has traveled the length of the line, paint on the first car is dry enough to permit stencilling. This is also done with the spray equipment.

The spray booth is equipped with two exhaust fans, each having a capacity of 8,400 cfm. These exhau fans deliver the air to a stationa exhaust duct which runs under th roof for the length of the buildin Three exhaust fans on the roof mai tain suction in the stationary exhau duct. Only one of these fans is in op eration at any one time, as limi switches are used so that fans cut i or out, depending on the position o the spray booth as it travels. Eac of these fans has a capacity of 19,60 cfm. The air make-up unit, locate in an annex to the main paint-sho bay, has a capacity of 18,000 cfm.

In this same annex are the boile room, locker and shower rooms, o fice, stencil room, and paint storag Near the finish end are vats for clea ing the stencils.

Scale for weighing the cars is o the outbound track. Here the stenci ling can be completed before cars ar moved to the transportation yar Near the outbound end of the shop a pit from which cars can be unde coated.

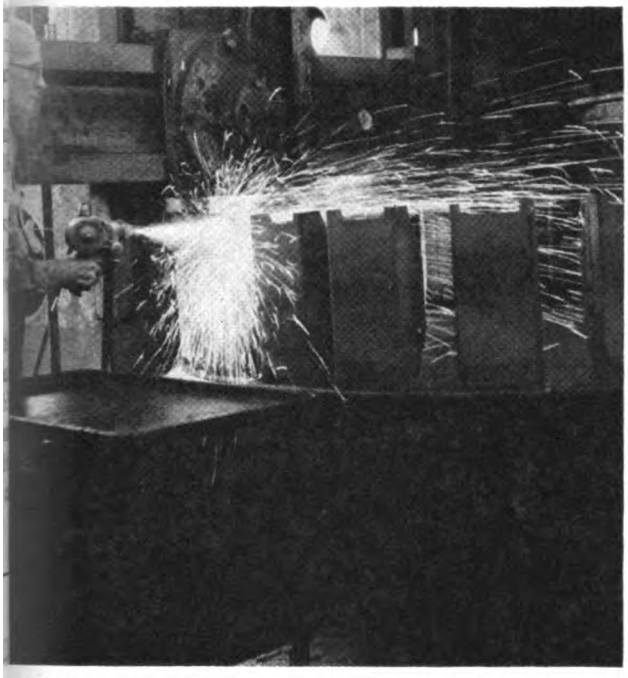


German-Built Diesel-Hydraulics Arrive in U. S.

Six 4,000-hp diesel-hydraulic road locomotives built by Krauss-Maffei of West Germany arrived in Houston, Tex., aboard the Norwegian freighter Christian Smith on October 28. Three units were ordered by the Southern Pacific and three by the Denver & Rio Grande Western (RL&C, September 1961, p. 23). All units initially went into the Houston shop of SP-subsidiary T&NO to be prepared for service. The D&RGW locomotives were then to work their way to Denver, hauling Burlington freights. A. N. Bisgard, assistant chief mechanical officer of D&RGW, estimates that the three locomotives "will do about the same job we are now doing with five 1,750-hp diesel electrics, but the new locomotives will do the job faster." SP anticipates that advantages of new units as compared with diesel electrics may include: high torque conversion ratio; high factor of adhesion; continuous low-speed, full-load operation; ability to exert full tractive effort at standstill; lower unsprung weight on axles; lighter and smaller parts; sealed components excluding dust and water.

)iesel Repair Time Savers

:destal Liner Reclamation



ıois Central reclaims worn truck pedestal liners at its lucah, Ky., shop. Liners are sandblasted and then shot ıted in a Pangborn blast cleaner. Areas to be built up determined by straight edge, and unworn areas are ted to mask them. Liners are mounted on an old bor- mill equipped with fixtures to hold 35 liners. Bed ro- on is controlled by a foot-pedal. Liners are first sprayed ı nickel-steel Spra-bond and finished with Metcoloy 2 which can be applied up to 1/16 in. thick.

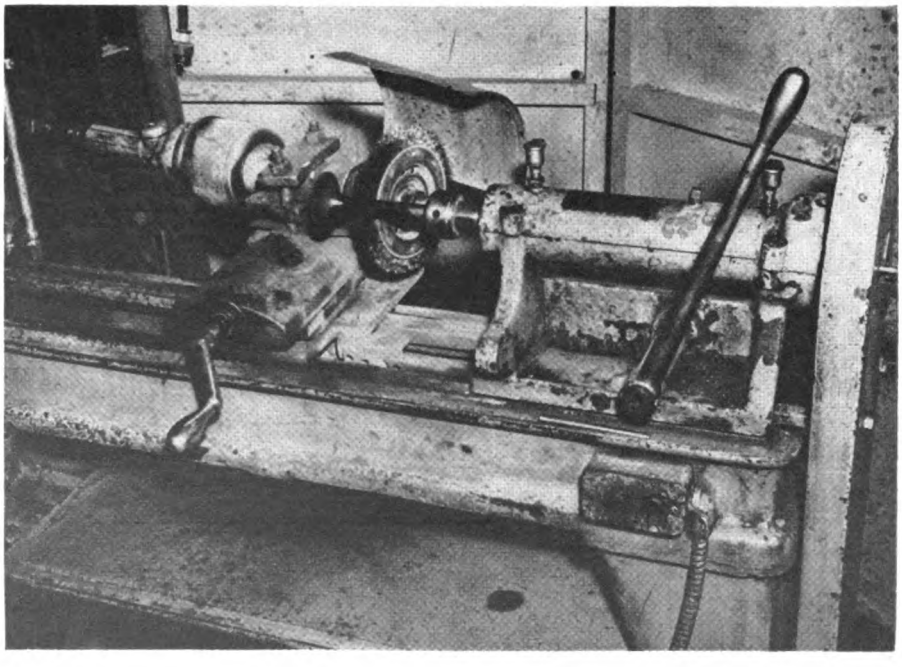
Oil Cooler Modification

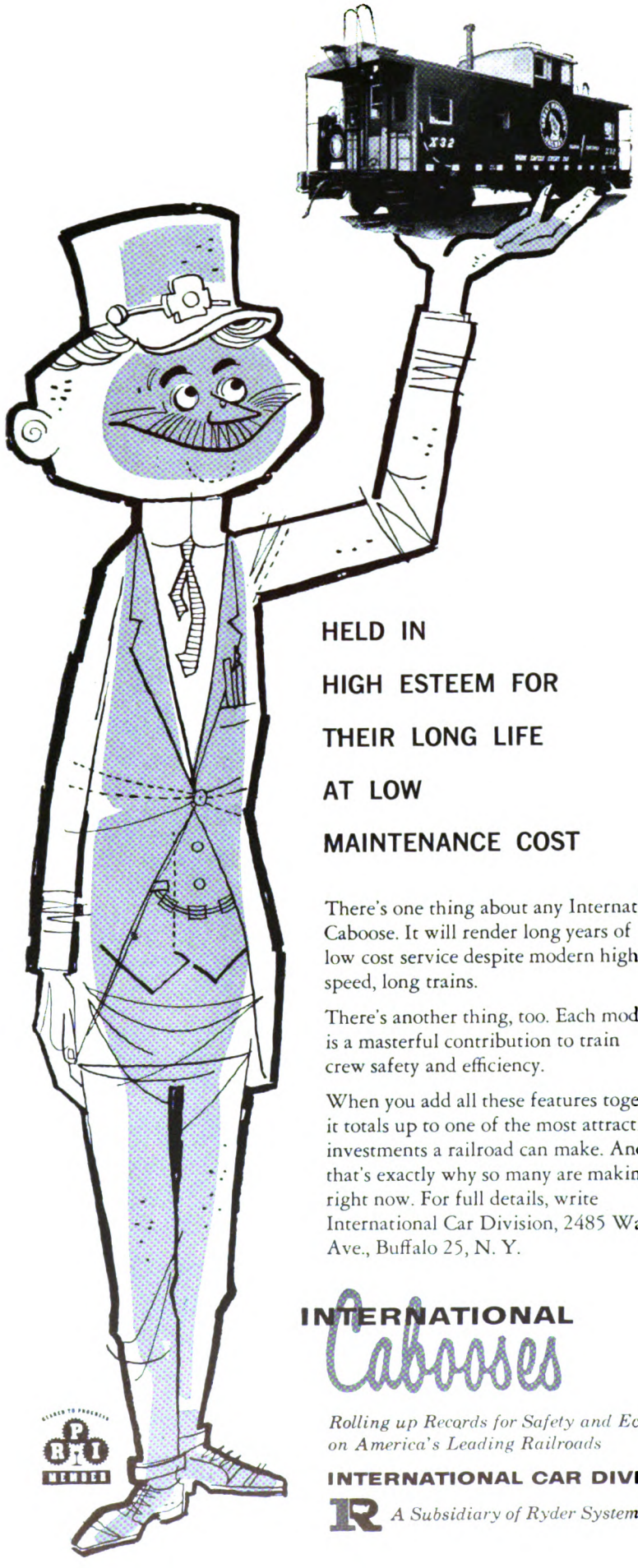


Modification of the old style EMD oil cooler discharge baffle plate to conform with the present standard baffle plate is being done in the South Louisville shop of the Louisville & Nashville. By cutting a slot 6 in. deep and 27 in. wide out of the top edge, the plate conforms to that now furnished in the EMD modification kit. A reinforcement angle is applied the width of the slot along the bottom edge. The plate is used in oil coolers for GP-9 road switcher and F-9 road freight locomotives.

inois Central alve Cleaning achine

centering machines equipped with motor driven wire buffers are used oints along the Illinois Central to n diesel engine valves. Each valve ıounted in a chuck and the buffer ıoved in to contact surfaces with d-up. Production has been in- ısed to about 275 valves per day one operator. The valves were nerly placed in a cleaning solution cleaned by hand on an emery ıd. Heavy gloves had to be worn protection, and the output was ut 70 valves per day.





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AT LOW
MAINTENANCE COST

There's one thing about any International Caboose. It will render long years of low cost service despite modern high speed, long trains.

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When you add all these features together it totals up to one of the most attractive investments a railroad can make. And that's exactly why so many are making it right now. For full details, write International Car Division, 2485 Walden Ave., Buffalo 25, N. Y.

INTERNATIONAL Cabooses

Rolling up Records for Safety and Economy on America's Leading Railroads

INTERNATIONAL CAR DIVISION

A Subsidiary of Ryder Systems, Inc.

Report

(Continued from page 10)

compiled. The June 1961 figure of 2[illegible] 338 miles per car set off is over 110,[illegible] miles better than the 1955 figure of 1[illegible] 666, the best previous June on reco[illegible] Monthly figures are given below.

	Cars set off between terminals with hot boxes		Miles per car set off
June 1956	21,902		135,[illegible]
June 1957	24,562		115,[illegible]
June 1958	18,013		145,[illegible]
June 1959	20,169		138,[illegible]
	Pads	Waste	
June 1960	1,795	14,934	159,[illegible]
1961			
Jan.	2,298	3,883	378,[illegible]
Feb.	1,994	4,679	332,[illegible]
March	2,252	4,132	393,[illegible]
April	2,098	3,702	448,[illegible]
May	2,191	5,016	363,[illegible]
June	2,193	6,608	293,[illegible]

Personal Mention



W. A. Mullen, B&O



W. F. Dadd, B&O



A. W. Gibson, B&O



J. G. Moore, Southern

Baltimore & Ohio.—*Baltimore, Md.:* [illegible] LIAM A. MULLEN, appointed superinten[illegible] car department. WILLIAM F. DADD [illegible] pointed superintendent motive power, E[illegible] ern Region, succeeding GUY F. WILES [illegible] tired. Mr. Dadd formerly superinten[illegible] motive power at Cincinnati, Ohio. ARC[illegible] BALD W. MCELVANY, supervisor mechan[illegible] methods, appointed superintendent mecha[illegible] ical methods, succeeding Mr. Mullen. [illegible] *cinnati, Ohio:* ALBERT W. GIBSON appoint[illegible] superintendent motive power, Western [illegible] gion. Mr. Gibson formerly assistant supe[illegible] intendent car department at Baltimore

Chesapeake & Ohio.—*Grand Rapids, M[illegible]* R. C. BLAKESLEE, car foreman, appoin[illegible] car shop superintendent, succeeding C[illegible] THOMAS, now district car forman.

Joliet & Eastern.—*Gary, Ind.:* RAY E. :N appointed assistant road foreman of ies-assistant trainmaster, Gary divi- *Joliet, Ill.:* THOMAS E. CONDON ap- ed road foreman of engines and sys- air-brake supervisor. ROBERT M. ABERLIN appointed road foreman of ies and assistant trainmaster, Joliet ion.

nd.—*Rutland, Vt.:* JOHN W. LOVETT, ager of personnel, appointed general ager, with jurisdiction over purchases stores, transportation, maintenance of maintenance of equipment, and per- el departments.

Fe.—*Los Angeles, Calif.:* ROY V. RING, general car foreman, retired.

hern.—*Washington, D.C.:* J. G. MOORE inted assistant-vice president - mechan- succeeding R. E. FRANKLIN, resigned. Moore, formerly superintendent of tenance equipment at Charlotte, N.C., ed the Southern in 1941. After serving arious supervisory assignments at Meri- , Miss., he was transferred, in 1953, to Charlotte Roadway Shop where he sub- iently served as assistant to shop super- ndent, shop superintendent, and super- ndent of maintenance equipment.

hern Pacific.—*San Francisco, Cal.:* S. M. STON, general superintendent mechani- department, retired. F. E. RUSSELL, as- ant general superintendent mechanical artment-engineering, appointed chief hanical officer-system. D. K. MCNEAR ointed assistant chief mechanical officer- ineering. N. L. MCCRACKEN, assistant eral superintendent mechanical depart- nt-engineering, appointed assistant chief hanical officer-maintenance.

nessee Central.—*Nashville, Tenn.:* F. OOKS BEARDON, acting chief mechanical cer, appointed chief mechanical officer.

OBITUARY

F. Leppla, retired mechanical engineer, ck Island, died September 2 in Torrance, lif.

upply rade Notes

B. FORD DIVISION, WYANDOTTE EMICALS CORP.—*John J. Wilson,* field vice manager, Philadelphia district, ap- inted district sales manager, New York ritory. *James S. Nubbard,* New York anager, transferred to manage Cincinatti, io, operations. *E. S. Schmeling,* Cincin- ti, appointed district sales manager, Chi- go.

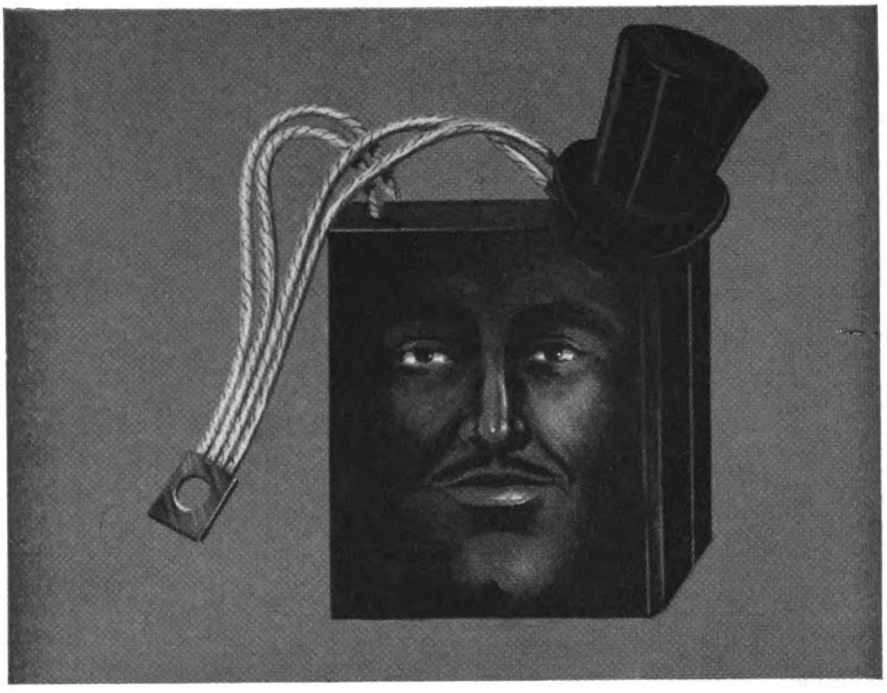
■

ATIONAL CASTINGS CO. — *Kenneth Selby* elected vice-president of National astings and group executive of Transpor- tion Products and Capital Foundry Divi- ons. *Mellor W. Stevenson,* vice-president les, Transportation Products Division, cceeds Mr. Selby as vice-president and neral manager of the Transportation roducts Division.

■

OLORADO FUEL & IRON CORP.— . L. *Hanes* elected vice-president in charge f sales, Western Division.

WANTED



For Contempt of Commutators

. . . by committee investigating railroad maintenance costs. A suave, sophisticated air hides suspect's sadistic and larcenous nature. Record of previous arrests includes bar burning, grooving, and goughing — all involving highly-valued diesel-electric commutators.

Any railroad employee knowing whereabouts of suspect should immediately contact Stackpole Carbon Company, St. Mary's, Pa., and collect his reward — a personal evaluation of his diesel-electric brush needs based on obtaining maximum mileage consistent with smooth, burn-free commutation.



STACKPOLE *diesel-electric* **BRUSHES**

profitable operation through optimum commutation

electrical contacts • seal rings • welding & brazing tips • graphite bearings
electrochemical anodes • voltage regulator discs • electrical & electronic components
rocket nozzles



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with Men Trained in RR Supervision

Now you can take a big step forward to improve human relations and solve operational problems... keep jobs running smoothly and efficiently... with the aid of a carefully developed training program for supervisors and for men preparing for supervisory work.

To meet the growing demand for just such a training program, a brand new two-year course in the fundamentals of supervision has been designed especially for railroad men by the Railway Educational Bureau.

Here you have a home study course based on a highly specialized series of texts covering the latest methods of supervision. The first half deals with the human side of supervision; the second with the material side (costs, planning, etc.). Designed especially for railroad men, it is prepared in *railroad* language, deals with actual *railroad* situations.

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☐ I have not received your free descriptive folder. Please send me one without obligation.

Name_____Title_____

Company_____

Street_____City_____Zone____State_____



Robert A. Sherman, Budd



Samuel W. Mo... Budd

BUDD CO.—*Robert A. Sherman*, reg... sales manager, Railway Division, ... York, appointed vice president-sales, N... eastern region, New York. *Samuel W. ... deira*, district sales manager, Southe... region, Railway Division, Philadelphia, ... pointed vice-president-sales, Southe... region, succeeding *Percy R. Keller*, re...

■

GRIFFIN WHEEL CO.—New $6,0... steel-wheel plant, covering 135,000 s... and having a capacity of 148,000 whe... year, opened at Bensenville, Ill., north ... of Chicago. This is fourth wheel pl... be constructed by Griffin in less than ... years. Executive sales offices being ope... in International Building, 630 Fifth A... nue, New York.

■

AMERICAN CAR & FOUNDRY D... ACF INDUSTRIES, INC.—*John M. Gu...* Philadelphia district sales manager, ... pointed New York district sales mana... succeeding *Thomas A. Ballou* now ma... of railway equipment sales (RL&C, S... p 47).

■

AMERICAN STEEL FOUNDRI... TRANSPORTATION EQUIPMENT DIV.— *... ter Moryto*, manager service engineer... section, appointed also mechanical assi... to vice-president of division.

■

SYMINGTON DIV., SYMINGTON-W... CORP.—*Ernest J. Warnock* appointed ... mechanical engineer, succeeding *C. J. ... Lusink*, retired.

■

ELECTRIC STORAGE BATTERY Co... *W. W. Gould*, Chicago district manage... Nickel-Alkaline division, appointed n... iron battery market manager, Exide In... trial Marketing division.

■

RAILWAY MAINTENANCE CORP... *Holden Co., Ltd.*, Montreal, appointe... clusive Canadian representative.

■

ENTERPRISE RAILWAY EQUIPME... CO.—*John Dewar* named sales manage...

■

UNION SPRING & MANUFACTUR... CO.—*Raymond M. Beacha* appo... manager of spring sales.

■

OAKITE PRODUCTS, INC.—*D... F. Moulton* appointed technical servi... resentative in Vermont.

■

AIR REDUCTION SALES COMPA... DIVISION OF AIR REDUCTION CO.— ... *Langley* appointed manager, Philad... district, succeeding *R. H. Merriman*.

STINGHOUSE AIR BRAKE CO.—*C. Landis,* vice-president and general ıager, Air Brake Division, retired.

■

ENT HOIST & CRANE.—*Edwin G. l,* Philadelphia, Pa., appointed railroad s representative, Philadelphia district.

■

.GNUS CHEMICAL CO.—*E. H. Peter-* executive vice-president, elected presi-t, succeeding *W. M. Campbell,* who con-ıes as chairman of the board.

OBITUARY

MES F. McCARTNEY, manager-dis-t sales, McConway & Torley Corp., tsburgh, Pa., died Sept. 23.

rade Publications

RETHANE INSULATING FOAM. 4-ge bulletin gives information on advan-ges, mixing and K-factors of Nopcofoam 602 and illustrates results of low-temper-ıre tests on conventional foam and the w formulation. (Write: *Plastics Div., ›pco Chemical Co.,* Dept RLC, 175 huyler ave., North Arlington, N. J.)

■

EST EQUIPMENT. Fuel pump, injec-r and governor test equipment for rail-ay and transport gas turbines and diesel gine overhaul shops, etc., described in w catalog. (Write: *Marine Pumps, Inc., vision of Diesel Control Corp.,* Dept. LC, 226 N. Marine ave., Wilmington, alif.)

■

LEANING MATERIAL. Service Bulletin o. 56B describes technical features of, ıd specific uses for, Oakite 88, and gives eneral information on techniques for eaning rolling stock. (Write: *Oakite roducts, Inc.,* Dept. RLC, 146 Rector st., lew York 6.)

■

RANES. 20-page bulletin illustrates and escribes industrial and mill type overhead raveling cranes. Included are tables of learance dimensions for crane capacities f 5 to 500 ton and spans from 20- to 150-t. Features include sell-aligning bearings, ıerringbone gears, flexible couplings, one-›iece trolley framework and end truck and velded girder construction. (Write: *Mil-waukee Crane, Division of Novo Industries, Inc.,* Dept. RLC, Cudahy, Wis.

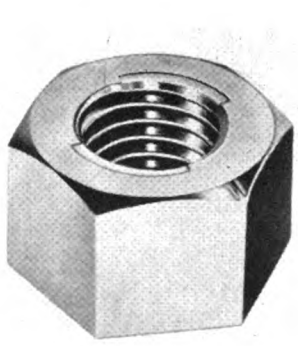
OPPORTUNITY

Considering expansion of our sales program on a national scale of an outstanding specialty for railway cars, etc. Would like to hear from interested applicants age 35-40 years, experienced in the sales and servicing of railway apparatus. Engineering experience desirable. Replies should include complete qualifications and resume of full particulars for such position. Replies treated confidentially. Address Box 978, RAILWAY LOCOMOTIVES & CARS, 30 Church Street, New York 7, N. Y.

What's New

(Continued from page 12)

The system also makes possible sandblasting, where indicated, and a uniform application of most types of protective coatings can be made following cleaning operation. *United States Railway Equipment Co., Dept. RLC, 231 S. La Salle st., Chicago 4.*



Lock Nut

The Uni-Torque lock nut is said to assure positive locking action in applications where there is severe vibration or heavy shock loading. It is a one-piece, all-metal, reusable torque type of lock nut in which the lock is developed by deflecting the top threads slightly out of their true helix. It starts freely on the bolt until the deflected threads are reached, then wrenching is needed. Nut will lock in any position on bolt provided a minimum of 1 to 1½ bolt threads protrude beyond top of nut. The nut is available in a wide range of sizes and materials. *MacLean-Fogg Lock Nut Co., Dept. RLC, 5535 N. Wolcott ave., Chicago 40.*



Crane Carrier

The Model 1566 road and rail crane carrier is the first CCC road-rail carrier equipped with hydraulically operated rail guide wheels for track operation. Prior models have been mechanically operated. The rail wheels are retractable. This permits the carrier to be driven to remote areas for use by railroad repair and maintenance crews. The carrier, after installation of a Bucyrus Model 14-B 15-ton capacity transit crane, will be placed in operation on the Northern Pacific. *Crane Carrier Industries, Inc., Dept. RLC, Tulsa, Okla.*

Increase Wheel Life up to 300%!

With Nalco Moly Stick Flange Lubricant

Nalco "Moly Sticks", made of tough, long-lasting molybdenum disulfide, offer railroads flange lubrication which can increase wheel life as much as three or four times. These "Moly Sticks" are applied precisely where needed, with a Nalco Flange Lubricator—give wheel flanges a tough, long-lasting (up to 6000 miles per stick) dry lubrication. It won't creep or pick up brake shoe dust or sand that converts ordinary oil or grease type lubricants to abrasive mixtures. The result: Fewer wheel turnings and renewals, reduced labor and material costs.



Moly Sticks

easy to install, easy to maintain

Simply-designed Nalco Flange Lubricators make application of "Moly Sticks" quick and easy—a far simpler and lower-cost system than "wet" lubrication. They're easy to install, too: a diesel locomotive can be outfitted with eight lubricators in less than one man-day. After installation, Nalco Flange Lubricators can be swung out to inspect or replace "Moly Sticks" and swung back into place—without tools or special equipment.

For details about Nalco "Moly Sticks" and Nalco Flange Lubricators, call your Nalco Representative, or write directly to:

NALCO CHEMICAL COMPANY

6190 West 66th Place • Chicago 38, Illinois

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In Canada: Alchem Limited, Burlington, Ontario

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Now—make each car a traveling billboard with colorful decorations that advertise your Corporate image and services wherever it goes.

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Color styling and designing available on a consultation basis.

Write now for complete information.



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5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required by the act of June 11, 1960 to be included in all statements regardless of frequency of issue.) 5,834.

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Interview with W. G. Boese, Chief Welding Engineer, Pullman-Standard

Welded, Cast, Riveted...Which Type of Underframe Gives Freight Car Buyers the Most for the Money?



W. G. Boese

"For the best underframe and best buy, choose welded construction," says W. G. Boese. Here are his reasons.

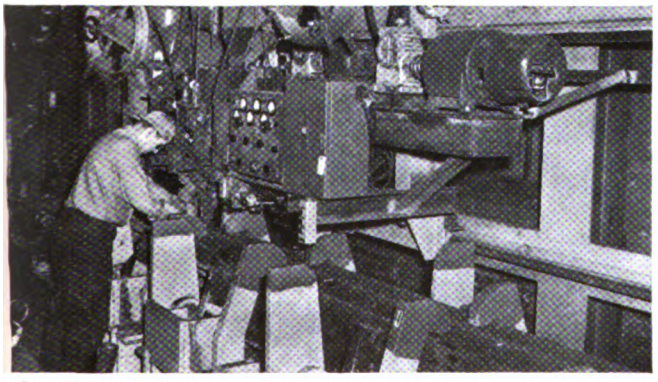
Q. Mr. Boese, freight car underframes are fabricated by welding, casting or riveting. What should a freight car buyer know to be sure of selecting the best type?

A. He should know that all three types are suitable, but that none are perfect. He should also know that welded units with welded bolsters, center fillers, and front and rear draft lugs not only provide well-proved advantages, but they do not require payment of any penalties such as added weight and cost.

Q. What do you mean by "well-proved" advantages?

A. More than 25 years ago Pullman-Standard realized that there were shortcomings in riveted underframes, so we began to design and test underframes with welded components. To be sure we were on the right track, we had Purdue University perform a series of comparison tests between draft lug construction of a welded type with the A.A.R. standard riveted type. The welded unit proved to be immensely superior.

Under the 27,000 pound drop hammer test the A.A.R. riveted design failed by shearing rivets at a force of 870,000 pounds. The P-S welded design withstood a force of 970,000 pounds and was still considered serviceable. The damage . . . a deflection of only 0.29 inches in the rear draft lugs.



Q. Was this the only test made?

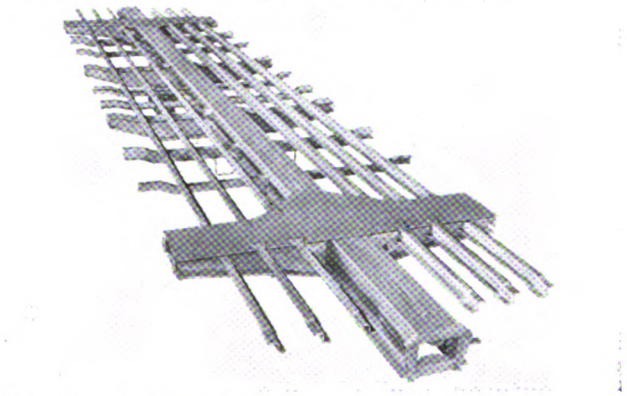
A. Absolutely not. Over the years, many exhaustive tests were conducted, some by Northwestern University, and many by Pullman-Standard's own Research and Development Laboratory. All tests proved the superiority of P-S welded draft lugs and center fillers over A.A.R. riveted designs. And, these were tests of Pullman-Standard production run cars of all types; not cars especially built or singled out for testing. But, I think the most conclusive proof of all is in the daily performance of over 250,000 freight cars with P-S welded draft sills in service today, including nearly 100,000 PS-1 Box Cars with all-welded underframes. A large percentage of these cars have been in service twenty years or more.

Q. Do you know how various types of underframes are performing in service?

A. Yes, we try to keep up to date on this. We maintain a team of Field Service Engineers constantly on the road. These men inspect Pullman-Standard and competition-built freight cars, give them complete physical examinations and report the findings. They have inspected nearly 22,000 freight cars, and with rare exception, found that P-S welded underframes stay in sound serviceable condition. When repair or maintenance is required it's usually minor, and easily done.

Q. How does this inspection process show other types of underframes are performing?

A. Since I've touched on riveted and welded, that leaves only cast units. Not too many of the cast units could be found and still fewer of the relatively new arrangements using the cast underframe end and bolster were located for inspection. However, as with other type underframes or draft sills or bolsters, fractures were noted; but of equal or more importance was the condition found at the bolster connection to the side sill. Here, in many cases the side sill was buckled. The complete lack of flexibility in the cast end unit transmitted the forces not absorbed by the coupler directly to the car structure.



Q. Is there anything else?

A. Well, as you can guess, I am convinced that welding is the answer, along with proper and proved design, to obtaining the best value in car underframes. Pullman-Standard is a leader and pioneer in advanced automatic welding techniques, and our quality control insists that every weld be right. We test and retest, check and recheck. For example, not only is the welding tested and checked, but each new order of welding rod is checked and chemical composition of the steel is tested. For new jobs or new welding applications, if the right machine isn't available we design it in our own welding research laboratory and have it built or build it ourselves. The quality results and production economies make it pay.

Look at it this way, a car buyer who wants the best underframe and best value would be well advised to specify P-S welded underframes. He can take a long range look forward to savings, not only in initial costs but also in reduced repair requirements, then invest this saving at the time the cars are built in such dividend paying items as nailable steel floors, roller bearings or lading protection units that will extend car life and improve service to customers.

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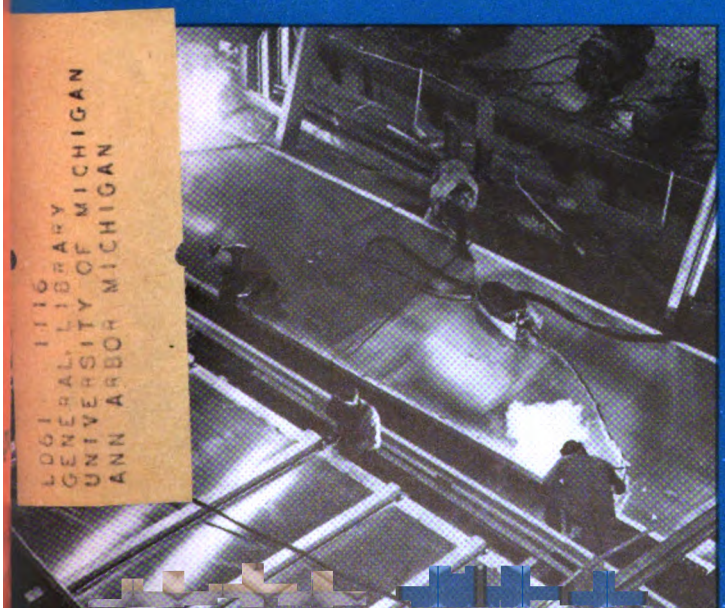
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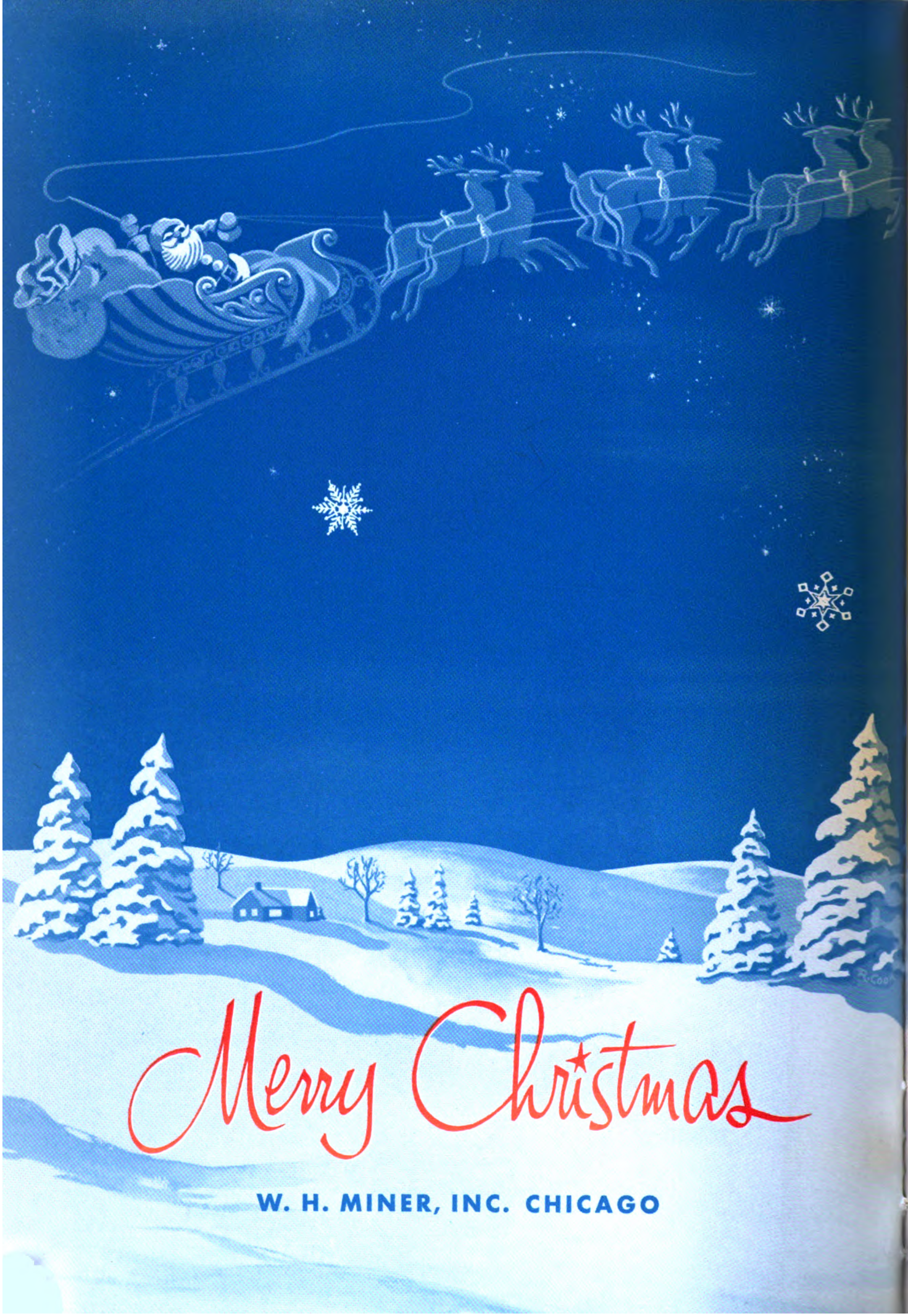




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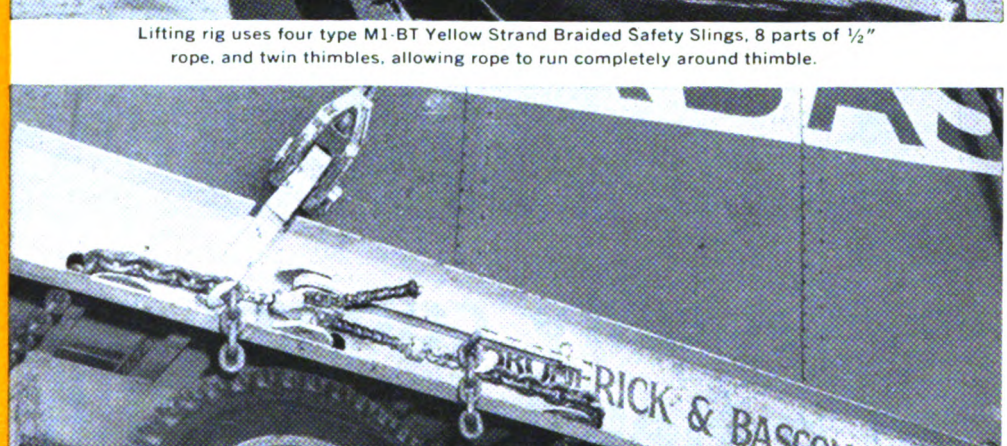

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on piggy-back loading operation



Lifting rig uses four type M1-BT Yellow Strand Braided Safety Slings, 8 parts of ½" rope, and twin thimbles, allowing rope to run completely around thimble.



Close-up showing hitching method. Alloy chain snubs channel-iron side rails tightly. Yellow Strand patented twin thimbles secure sling bridles to beam.

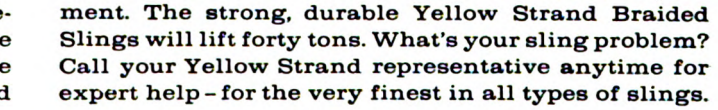


Type M1-TT Sling

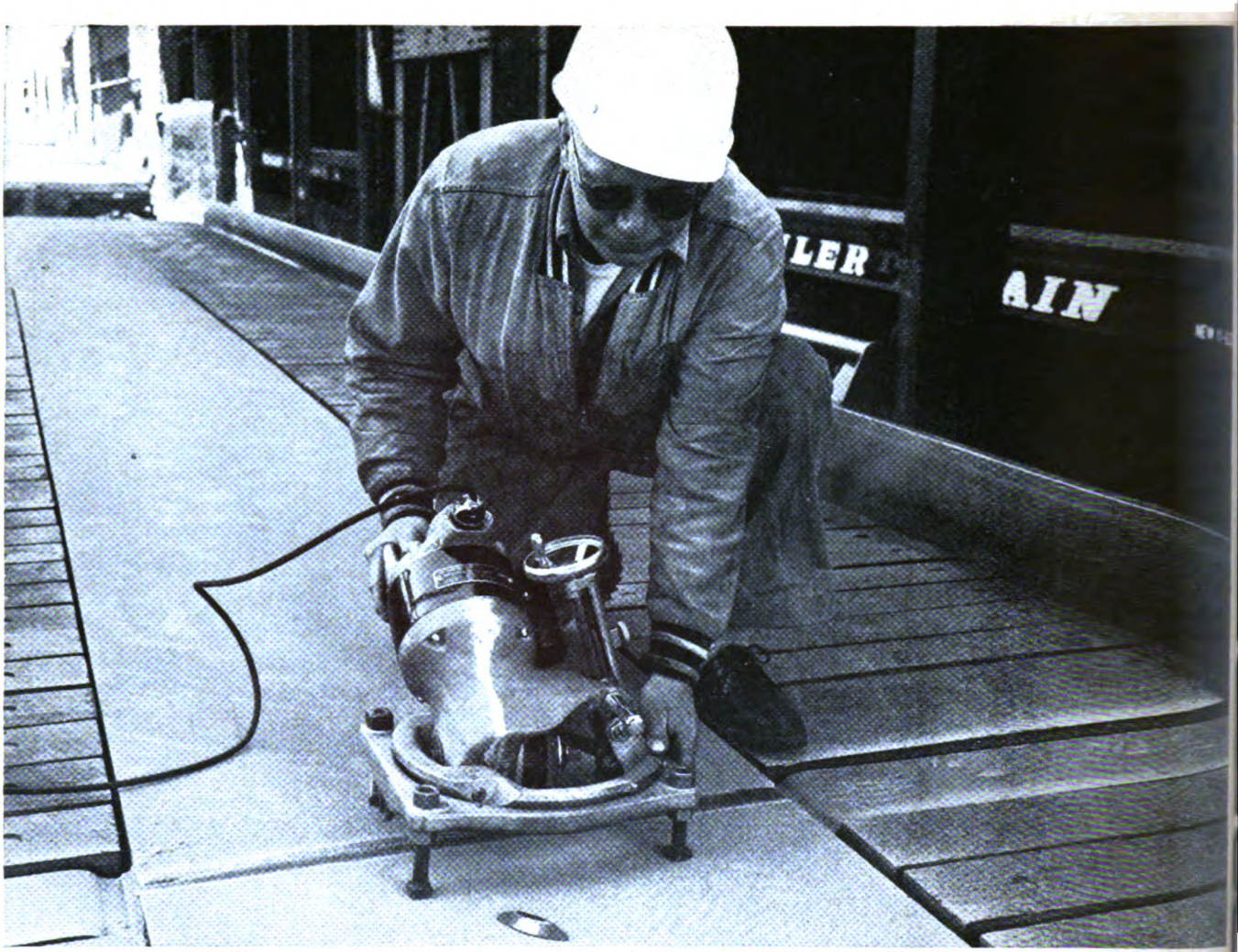
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Quality control at work on a Bethlehem 85-ft flat car



This 4-inch weld specimen gives inspector good look at weld quality. If it shows defects, a new weld is carefully supervised, and immediate steps are taken to correct the problem at the source. This is but one way in which Bethlehem upholds high level of quality on all freight cars.

What's this? Deliberately cutting up the center-sill cover-plate on a brand new piggyback flat car?

That's exactly what he's up to. He's holding a weld-prober, which cut the little boat-shaped specimen from the buttwelded joint in foreground. The specimen gives this quality control engineer a good look at the workmanship in the weld. If he spots any defects, such as slag inclusions, cracks, porosity, lack of fusion or penetration, he'll know what to do about them—*and he'll do it.*

The soundness of every weld and the quality of each part are essential to the service life of a whole freight car. That's why Bethlehem's quality control engineers are in the shops at all times, checking on every detail of construction, helping to overcome difficulties, often suggesting improvements.

It's paying off, too. We're developing such a high standard of excellence in car construction that one of these days we believe you will find it unnecessary to inspect our product. You will pocket the savings. We'd like to demonstrate our ideas of quality on your next order.

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REPORT FOR DECEMBER

More Liberal Depreciation Sought for Rolling Stock

Prospects are that the Internal Revenue Bureau may soon establish more favorable depreciation rates for railroad rolling stock. An administrative ruling allowing faster equipment write-off, a good possibility in the light of recent similar action involving the textile industry, would produce results which the carriers have been attempting to achieve in Congress. Depreciation reform would apparently serve to stimulate the buying of rolling stock.

For income-tax purposes, different types of railroad equipment have depreciable lives of up to 35 years. Railroads, their suppliers, the Railway Progress Institute, and the American Railway Car Institute are all making presentations which urge the establishment of a depreciation term of 15 years for rolling stock.

In a message to Henry H. Fowler, Under Secretary of the Treasury, declared the railroads and shippers owning rolling stock "have reached what we consider to be the major impasse in their economic development. Aside from rate-making restrictions, the greatest deterrent economically for the common carrier has been the unrealistic depreciation policy of the Government.

"A depreciation rate with a maximum of a 15-year life for rail equipment is an economic must for the survival of our common carriers and private owners and for the subsequent improvement in their ability to meet any transportation emergencies of the future."

Mr. Renz cited record cash outlays by the commercial car builders to develop new types of railway cars and services. He called these cars "the one bright hope for the railroads." But, he added, "in their straitened circumstances they have about reached their limit in purchasing." Liberalized depreciation is sorely needed, he told Mr. Fowler, "not only to restore the economy and competitive standing of the railroads, but to insure that the transportation backbone of this country will survive."

Turning to the depressed carbuilding industry, Mr. Renz said its backlog was "at its lowest ebb since the depreciation 25 years ago, despite the fact that this very industry has been utilizing all its resources in research and development to enable the railroad industry to have equipment which will be competitive and bring business back to the rails."

Secretary of the Treasury Dillon has revealed that shorter depreciation terms would be considered for all industries. What industries get "will depend upon their particular conditions and circumstances," the White House has said. BIR rulings on the railroad plea and similar presentations of other industries are not expected until next spring, but there is hope that they will apply to the entire year 1962.

Because rolling stock must be depreciated over periods up to 35 years, depreciation rates for the industry are well under 3%. This slow rate of recovery has made it difficult for the railroads to obtain financing for the badly needed new equipment.

To point up this problem, the AAR has stated a simple, factual situation: "What railroads are up against can be illustrated by their efforts to streamline the freight-car fleet. When railroads buy a freight car today to replace one costing $2,500 in the 1930's, they find that the price—due to wage increases, material costs and inflation, as well as many structural improvements—has risen to about $9,500. To obtain the $7,000 difference from net income under today's 52% corporate tax rate, a railroad must earn, before taxes, about $14,000."

What this kind of tax treatment forces the railroads to do, of course, is to use the depreciation allowances from several old cars to meet the current payments on a

TIME SAVING IDEAS FOR DECEMBER

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single new unit. The inevitable effect is the shrinkage of the freight-car fleet to a level that is now dangerous to the railroads' economic health, the needs of commerce, and the nation's defense position.

ACF Consolidating Carbuilding Facilities

Called "a step decisive in the continuing effort to alleviate historical feast or famine aspects" of the railway carbuilding industry, W. T. Taylor, chairman of ACF Industries, has announced plant consolidations which will result in the closing of ACF's Berwick, Pa., facilities late in 1962. At the same time, Mr. Taylor said ACF will cease to build passenger equipment, maintaining only design and engineering capabilities which will be available on a consulting basis to transit agencies and manufacturers.

All ACF carbuilding operations will be consolidated in Milton, Pa.; Huntington, W. Va., and St. Louis, Mo. Milton will build complete tank cars; Huntington will produce covered hoppers and open-top cars, and St. Louis will specialize in box cars, piggyback flat cars, and related equipment.

Mr. Haylor pointed out that while the railroads have been buying fewer standard general-purpose cars, those which are being acquired are more and more frequently built by the railroads, themselves. Railroads are relying on commercial carbuilders primarily for special-purpose equipment. Mr. Taylor said that the ACF consolidations should eliminate high-cost standby carbuilding facilities. ACF expects to be in an improved position to design and produce special purpose cars while retaining sufficient capacity for all standard car construction. "Consolidation and modernization at the three remaining plants will result in greater efficiency, reduced overhead, lower break-even point, and an improved competitive position," Mr. Taylor said.

Orders and Inquiries for New Equipment

Placed Since Closing of November Issue

Diesel-Electric Locomotive Orders

SANTA FE. *General Electric:* 8 U25B 2,500-hp diesel units for use in high-speed freight service. for March 1962 delivery.

Freight-Car Orders

ATLANTIC COAST LINE. — Pullman-Standard: 350 50½-ft box cars; American Car & Foundry: 350 50½-ft box. These 700 cars include 500 50-ton cars equipped with lading band anchors; 100 50-ton cars equipped with sliding sill cushioning devices and damage free loaders, and 100 70-ton cars specially designed to handle heavy loads and equipped with long travel, sliding sill cushioning devices and damage free loaders. All roller-bearing equipped.

GREAT NORTHERN.—*General American:* 20 Airslide covered hoppers. For delivery second quarter 1962.

ILLINOIS CENTRAL.—*Pullman-Standard:* 100 70-ton covered hopper, for bulk grain commodities. Cost, $1,130,000. Delivered.

SEABOARD.—*Pullman-Standard:* 500 70-ton steel box cars to be equipped with roller bearings, cushion underframes, nailable steel floors, aluminum doors, and special protective bulkheads. Cost, $7,600,000. *Magor Car:* 95 90-ton jumbo-type, roller-bearing covered hoppers. *American Car & Fdry.:* 5 90-ton jumbo-type, roller-bearing covered hoppers. Cost of Magor and ACF covered hoppers $1,400,000. *Greenville Steel Car:* 300 70-ton open-top hoppers, costing $2,500,000; 200 70-ton steel woodchip cars, costing $2,500,000. Deliveries of these 1,100 cars to begin in February and be completed during spring of 1962.

SOO LINE.—*Bethlehem Steel:* 15 85-ft TOFC cars; Pullman-Standard: 40 box with lading protection devices. *Ortner:* 6 tinplate gondolas; 20 steel billet gondolas; 20 4,000 cu ft capacity covered hoppers. Cars part of a $1.3 million program authorized in September (RL&C, Oct. 1961, p 8).

SOUTHERN—*American Car & Fdry.:* 47 10[illegible] 30,000 gal, rubber-lined tank cars for han[illegible] phospatic acid. Approximate cost, $987,000.

TRANSPORT LEASING. — *Pullman-Standard:* TOFC cars. Cost $165,000. Delivered.

WESTERN PACIFIC.—*Thrall Car:* 10 10[illegible] 4,000-cu ft stainless-steel covered hopper [illegible] for bulk shipments of malt, rice, other food s[illegible] and chemicals. To be built without center [illegible] and with bodies of Tenelon. Can be unl[illegible] pneumatically or through four center disch[illegible] gates. Estimated light weight, 57,000 lb.

Notes and Inquiries

Atlantic Coast Line will place orders in "in[illegible] mediate future" for 300 covered phosphate [illegible] per cars.

Great Northern has authorized its subsidi[illegible] Western Fruit Express, to acquire 35 50-ft [illegible] ion underframe, insulated box cars, and 10 a[illegible] tional refrigerated trailers.

Louisville &: Nashville has authorized exp[illegible] ture of $3,580,200 for rebuilding 1,000 coal ho[illegible] cars in company shops, and $43,740 for inst[illegible] tion of damage free type bracing in 18 additi[illegible] box cars.

Missouri Pacific board of directors has appr[illegible] $27-modernization program, including $7.7 [illegible] lion for 500 new roller-bearing freight cars [illegible] conversion of 200 existing flat cars for piggy[illegible] use. Also provided is $6 million for new di[illegible] locomotives (RL&C, Oct. 1961, p 8).

New Haven will send 10 locomotives to A[illegible] for rebuilding at a total cost of approxima[illegible] $900,000. A federal court authorized the expen[illegible] ture by the bankrupt road and also agreed to [illegible] sale of 428 old freight cars for scrap, proceeds [illegible] be applied to the cost of rebuilding the loco[illegible] tives. The locomotives were built in 1950 a[illegible] 1951.

Seaboard requesting bids on 150 70-ton cove[illegible] hopper cars for use in transporting phosph[illegible] rock.

Personal Mention



Frank E. Russell
SP



Norman L. McCracken
SP



Denman K. McNe[illegible]
SP

Central Vermont.—*St. Albans, Vt.:* DONALD L. SHEPARD appointed superintendent motive power and car equipment. *New London, Conn.:* GEORGE D. BENHAM appointed general foreman of motive power and car department, succeeding Mr. Shepard.

Chesapeake & Ohio.—*Grand Rapids, Mich.:* R. CLARENCE BLAKESLEE, car foreman, appointed car shop superintendent.

Fort Worth & Denver.—*Fort Worth, Tex.:* FRANK A. SMERKE, terminal master mechanic, retired.

New York Central.—*Cleveland, Ohio:* R. W. MUSTARD appointed mechanical superintendent, Western district, succeeding R. F. Batchman. *New York:* W. H. CHIDLEY appointed mechanical superintendent, New York district, succeeding Mr. Mustard. *Indianapolis, Ind.:* E. H. WRIGHT appointed mechanical superintendent, Southern district, succeeding Mr. Chidley. *Syracuse, N.Y.:* R. F. BATCHMAN appointed mechanical superintendent, Eastern district, succeeding Mr. Wright.

Norfolk Southern.—*Norfolk, Va.:* Headquarters of M. B. DOWDY, chief mechanical officer, and W. A. MILLER, mechanical engineer, moved from Raleigh, N.C., to Norfolk.

Southern Pacific.—*San Francisco, Calif.:* Following are brief sketches of careers of newly appointed mechanical officers reported in November issue:

FRANK E. RUSSELL, chief mechanical officer at San Francisco, entered SP service in 1928 as a special apprentice at Sacramento, Cal., serving subsequently as night enginehouse foreman, shop foreman, assistant master mechanic, master mechanic, assistant superintendent motive power, and assistant general superintendent mechanical department -engineering.

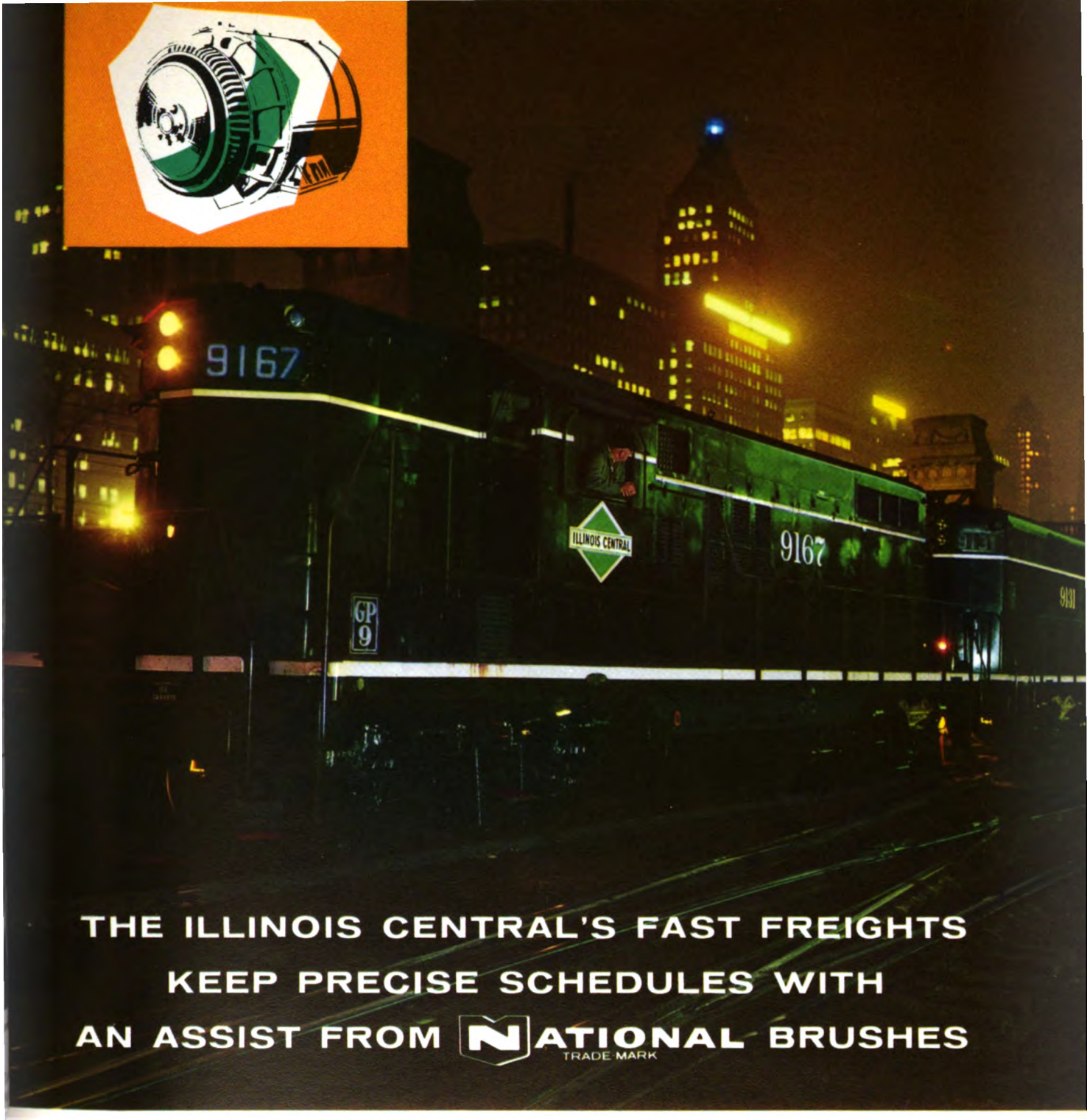
NORMAN L. MCCRACKEN, assistant chief mechanical officer — maintenance, began work with the SP in the general shops in Sacramento, Calif. Subsequently appointed assistant master mechanic at Eugene, Ore.; and master mechanic, Tucson Divisi[illegible] master mechanic, Los Angeles Divisi[illegible] assistant general superintendent of mot[illegible] power, and assistant general superintend[illegible] mechanical department.

DENMAN K. MCNEAR, assistant chief m[illegible] chanical officer—engineering, started [illegible] SP in 1948 as a technical student on S[illegible] mento Division. Subsequently served [illegible] assistant division engineer; construction [illegible] gineer, engineering department, at S[illegible] Francisco; trainmaster; assistant to ger[illegible] manager at San Francisco, and super[illegible] tendent, Rio Grande Division.

Southern.—*Greenville, S.C.:* E. D. BRA[illegible] LEY appointed road foreman of engi[illegible] Charlotte division.

OBITUARY

John A. Brossart, retired assistant ge[illegible] superintendent of equipment of the N[illegible] York Central, died October 25.



THE ILLINOIS CENTRAL'S FAST FREIGHTS KEEP PRECISE SCHEDULES WITH AN ASSIST FROM NATIONAL BRUSHES

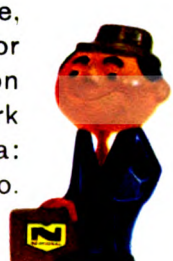
TRADE-MARK

Modern railroads like the Illinois Central are using fast freights to bring improved service to their customers. Programs of this nature require trouble-free motive power with minimum lost-time for maintenance.

All the components in the locomotive, no matter how large or small, must offer rugged, dependable service to assure that these complex schedules will be met.

"National" generator brushes—small but vital components—offer proved commutation and life, and operate with the reliability so necessary for today's progressive railroad service.

National Carbon Company offers a positive carbon brush service program to help America's railroads provide improved freight delivery. To realize this assistance, just call your "National" Brush Man, or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. In Canada: Union Carbide Canada Limited, Toronto.



Contact your "National" Brush Man

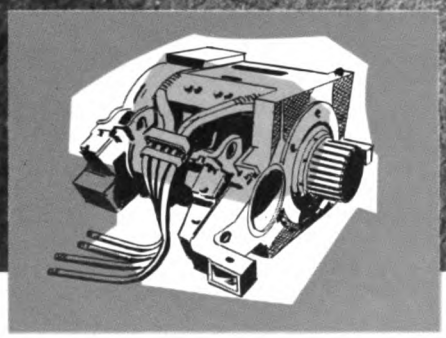
UNION CARBIDE

"National" and "Union Carbide" are registered trade-marks for products of

NATIONAL CARBON COMPANY

THE SOUTHERN PACIFIC'S FAST FREIGHTS MEET EXACTING SCHEDULES WITH AN ASSIST FROM NATIONAL BRUSHES

TRADE-MARK



Because of the Southern Pacific's fast-freight service, industrial customers served by this 14,900-mile rail network are permitted to maintain smooth production schedules with a minimum of inventory.

The close scheduling involved requires rugged and reliable service from fast freight diesel locomotives.

"National" traction motor brushes—wherever used on the Southern Pacific's 2,000 diesels—offer dependable commutation and life . . . and help keep motive power in service by reducing maintenance.

To meet today's constantly changing and more difficult electrical conditions, National Carbon Company contributes to improved railroading through a positive carbon brush service program. To realize this assistance, just call your "National" Brush Man or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. In Canada: Union Carbide Canada Limited, Toronto.



Contact your "National" Brush Man

UNION CARBIDE

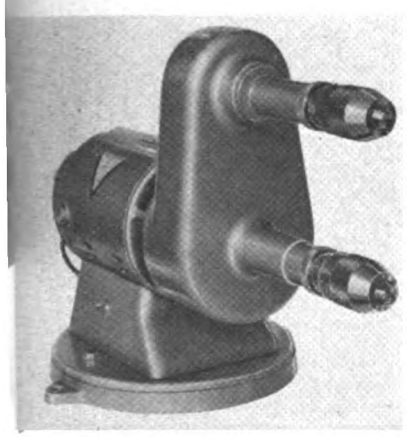
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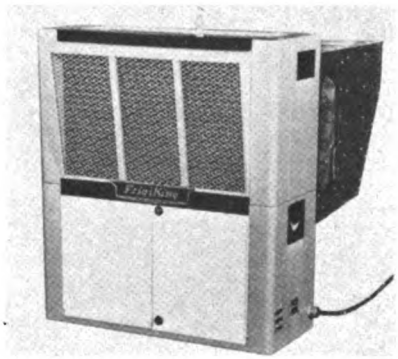
ieavy Duty Truck

he Super 70 Cary-Lift, suitable for han-ling loaded containers, has a capacity of 5 tons and a combination of hydraulic con-olled lifting, reaching, fork tilting and side ıifting movements to spot loads with pre-ision. The maximum forward reach is 10 : 8 in. and maximum height of lift with orks level is 17 ft 4 in. Forks can be tilted 2 deg back, 90 deg down, and entire as-embly can be shifted 12-in. each side of enter. The unit, which weighs 93,800 lb, is owered by a 350 hp Cummins diesel en-ine, and is equipped with power shift trans-ıission, planetary axles and torque con-erter. Travel speeds range from 3.23 mph) 24.06 mph. Attachments include crane oom, buckets and dozer blades. *Pettibone Mulliken Corp., Dept. RLC, 141 West Jack-on blvd., Chicago 4.*



Nozzle Lapping Process

The Hartridge Rapidlap is a diesel injector nozzle lapping machine with a specially de-signed lapping head assuring concentricity. It is said to reduce nozzle lapping time on an average reclaimable nozzle seat up to one-half the normal time. The machine can handle both small and large nozzles up to the U and V sizes and has high and medium speed spindles, providing two lap-ping speeds. The machine is mounted on a rotatable base. Its three-position head-stock permits the machine to be swung in-to position for either right-or left-hand op-eration. No keys or spanners are needed on the special chucks, and Pintle nozzles can be serviced as well as American Bosch, Bendix Scintilla, Fairbanks-Morse and Cat-erpillar nozzles. *Diesel Injection Sales and Service, Inc., Dept. RLC, 1120 E. Bram-bleton ave., Norfolk, Va.*



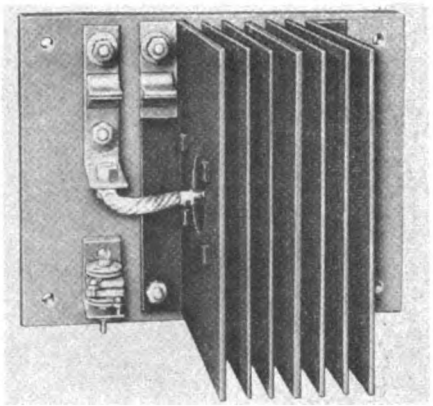
Refrigeration Units For Trailers

After extensive laboratory and road tests, four models of Frigiking Super Refrigera-tion units are now in production. The units—Super Models TR-250, TR-350, TR-500, and TR-800—are designed as a two-piece system consisting of an all-elec-tric, hermetically sealed refrigeration pack-age that mounts in an opening in the upper front wall of the trailer and a self-con-tained direct-connected engine generator from the trailer cross-members under the floor. Control of the system is automatic with a thermostat that provides either heat-ing or cooling. The refrigeration unit op-erates electrically from output of the 230-volt, 60-cycle, 3-phase engine-generator power unit while in transit, or from a plug-in source when the trailer is parked.

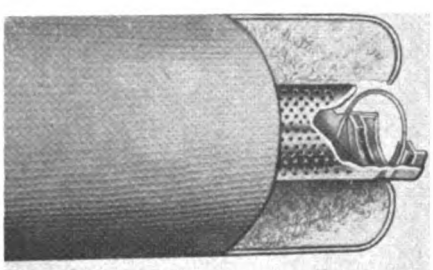
For piggyback service or other unattend-ed application, engine generator and re-frigeration unit run constantly at between 1,800 rpm and 1,200 rpm. The units de-frost automatically, utilizing electric heat. The air-cooled engines in the power units can be had for operation on gasoline, pro-pane, or diesel fuel. *Frigikar Corp., Dept. RLC, 10858 Harry Hines Blvd., Dallas 20, Texas.*

Battery Charging Rectifier

Mechanical reverse current relays and a battery-charging contactor switch, which are subject to wear, burning, or misadjust-ment when used in charging banks of bat-teries, are eliminated in the new F-M bat-tery charging rectifier for diesel electric lo-



comotives. Four variations are possible with the rectifier which is designed without moving parts. Each of two base sizes can have either of two current ratings—160 or 240 amp. Each rating has two possible va-riations—300 and 400—in peak inverse vol-tage rating. Inverse voltage rating is said to be more than four times greater than the voltage rating of the charging system. *Fairbanks, Morse & Co., Dept. RLC, Be-loit, Wis.*



Filter Cartridge

The Model SA-1349A cageless filter cart-ridge for diesel locomotive lubricating oil systems features a recessed gasket. It is said to have better sealing characteristics and longer filter life. The design keeps the gas-ket ½-in. from the outlet tubes of the filter housing, preventing distortion when the spider is tightened. *Superior Diesel Filter Co., Dept. RLC, 200 South Michigan ave., Chicago 4.*

Plate Edge Preparation Unit

The plate edge preparation unit is de-signed to cut a wide variety of plate edge profiles, using standard machine cutting torches with acetylene, natural gas, or pro-pane. The unit, it is said, makes accurate cuts on standard straight edges as well as single bevels, double bevels, or bevels with a nose, and is especially suited for car build-ing and reclamation operations. Cutting

(Continued on page 46)

new MAGPAD* with NAL



10 RAILWAY LOCOMOTIVES AND CARS • DECEMBER, 19



a low-cost lubricator that also has internal wicking and lock-stitched tufted cover

The heart of the new MAGPAD is NALUR — a specially formulated acrylonitrile foam rubber developed and produced by National Lead Company. It is highly resilient, has low oil swell characteristics and excellent resistance to compression set at high temperatures.

Outer cover is a heavy high-quality chenille, lock-stitched to withstand a 10-lb. minimum pull on tufts. End closures are tough cotton belting.

Ample internal wicking is provided by 25-ply candle-wick routed through ½" vertical orifices to provide unrestricted flow of oil.

Renovation—The MAGPAD with NALUR is sturdily made —its rugged construction permits renovation by any standard method in railroad use.

Get the full story on the new *low-cost* MAGPAD with NALUR. Ask our representative or write for details. Magnus Metal Corporation, 111 Broadway, New York 6, New York or 80 E. Jackson Blvd., Chicago 4, Illinois.

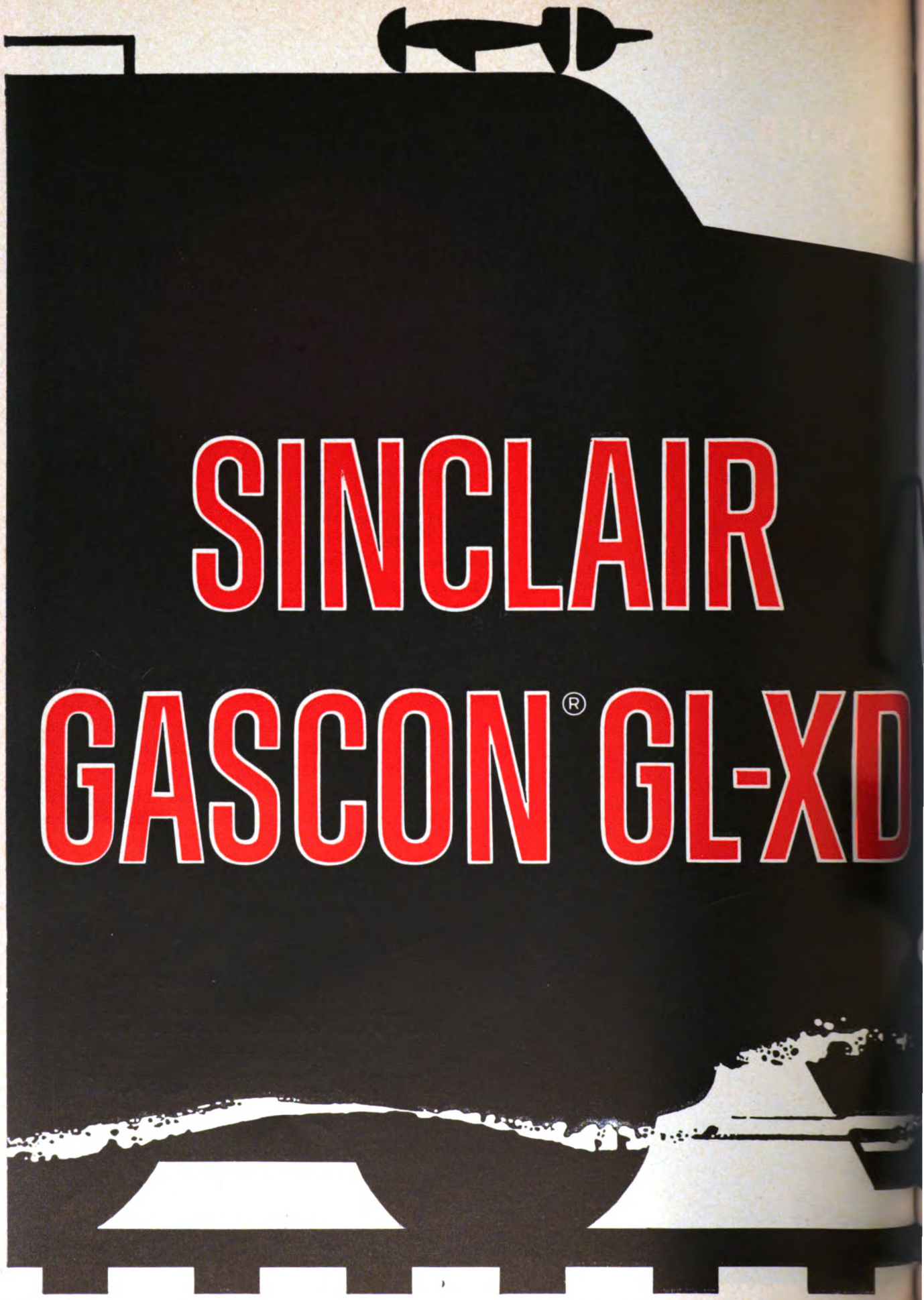
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SINCLAIR
GASCON® GL-XD



A Completely New Oil to Extend Service Life of Today's Higher Horsepower Locomotives

Gascon GL-XD, the newest in Sinclair's famed line of Diesel lubricating oils, has been approved by prominent locomotive engine manufacturers. Millions of miles of service on many of America's largest railroads prove you can get these advantages:

1. Greatly reduced engine wear
2. Improved oxidation resistance
3. Proven noncorrosive to silver and other bearing materials
4. Reduced engine deposits

For additional information, write or telephone Sinclair Refining Company, Railway Sales.
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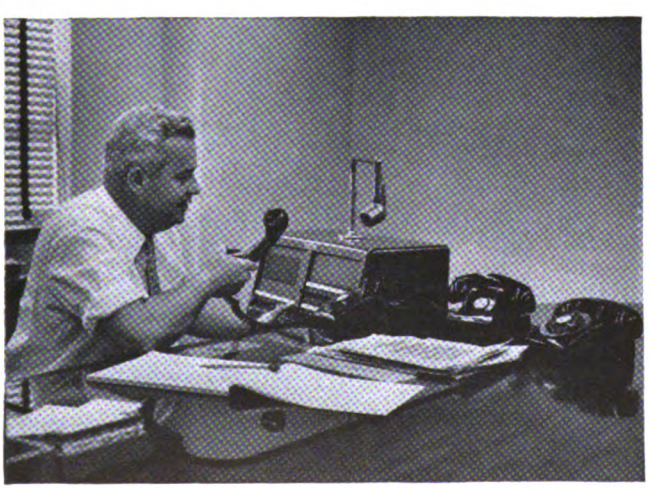


SERVO REPORTS HOW

RAILROADS WAGE WAR
against the hot box scourge

Progressive carriers find infrared cure for 'hardening of the arteries'

"...save just one wreck, and the SERVOSAFE® Hot Box Detective* has paid for itself."



W. D. Murphy, Mgr., Conway Classification Yard, Pennsylvania Railroad, Conway, Pennsylvania.

Main arteries of peace and plenty, strategic lifelines during war and national emergency, the nation's railroads hold an important key to the nation's survival. Strategic network for carrying men and materiel, elusive mobile missile bases for launching a lightning counterstrike at an aggressor, the rails stand firm—one of the country's most dependable "secret" weapons.

Yet today's accent is on speed, as well as dependability, a decisive weapon in itself. Consequently, the railroads are busy taking the kinks out of winding track, scheduling fewer stops, and installing better and better equipment. Object: to give the highball to faster freights and other strategic rail movements.

But trains, like chains, are only as strong as their weakest link. As freights move faster, the railroads' traditional problem, the *hot box*, becomes even more severe. One undiscovered hot box, one journal burn-off—and many cars can end up in a pile of rubble.

In recent years, on the average, hot boxes have cost American railroads over $15 million annually. And this just in derailments, damage, and delay. Yet consider the total "cost" of only a single derailment—life perhaps, cost litigation, maybe broader consequences.

FOR RAILROAD PROBLEMS: Rx

On November 16, 1956, the first complete installation of a SERVOSAFE® Hot Box Detective* was made on the lines of the Chesapeake & Ohio Railway Company at Norge, Virginia. Shortly afterward, writing in the C&O's 1958 annual report, M. I. Dunn, Vice President for Operations emphatically stated:

"I consider the hot box detector to be one of the greatest
s to railroading in many, many years. * * * Our tests
e proved it 100 per cent effective."

Today, more than *three hundred* SERVOSAFE detective
tallations later, 28 major Class I railroads across the
antry (and abroad) are benefiting from the protection,
vings, and other operating efficiencies of this amazing
frared safety device. A number of railroads have already
gun installing infrared hot box detectors system-wide.
ew roads are swinging in daily.

Day in, day out, in all kinds of weather, no passing jour-
al box can escape inspection and hot box detection by the
per-sensitive, ever watchful infrared trackside scanners
the eyes that "see" heat. The Detective will give positive
idence of abnormalities on tape from spotting points 100
iles or more away. It will automatically sound alarms, set
ackside signals to "stop."

The latest breakthrough, the "talking" Hot Box Detec-
ve, *radios* a passing train crew the exact location of a
angerously overheated journal anywhere from engine to
aboose—all automatically. Before serious trouble begins,
ne engineer can stop the train or slow it down to avoid a
re. broken axle, or disaster.

VHAT COST HOT BOX... VHAT PRICE WRECK

Let's face the cold, hard facts. Survival may be at stake. *More wrecks result from hot boxes, than from any other single cause!* Figure that the average train wreck may cost a railroad anywhere between $40,000 and $500,000.

In the words of one railroad official, "... save just one wreck, and the SERVOSAFE Hot Box Detective system has paid for itself."—(Add the words, "many, many times over!")

REDS 'DISCOVER' INFRARED

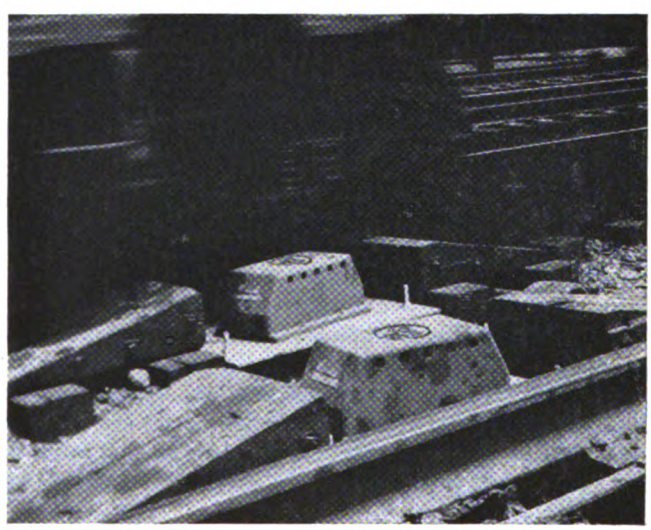
Throughout the rest of the world foreign railroads are modernizing and expanding at feverish pace.

A sobering report was issued from Moscow last year that Russian scientists had "discovered" an infrared hot box detector amazingly like our own—and that the Reds were busy installing the device at strategic locations throughout the Soviet and satellite rail networks.

'Way before Russia, from the same house that pioneered the major breakthroughs in infrared aerial reconnaissance and in heat-seeking infrared missile guidance systems—came the solution to control of the railroads' greatest problem: the hot box.

Here is the proved method for protecting strategic bridges, tunnels, yards, and structures... for safeguarding major rail arteries and rights of way.

Here is the patented SERVOSAFE Hot Box Detective system, the amazing "eye that sees heat."



Wheels whirl by infrared sentinels of SERVOSAFE Hot Box Detective system, the "eyes that see heat." No passing journal box can escape inspection and hot box detection. The Detective charts heat of *all* journals... instantly nabs dangerously overheated journal bearings, or "hot boxes."

Railroad Products Division

SERVO CORPORATION OF AMERICA

111 New South Road • Hicksville, L. I., N. Y. • WEls 8-9700

SERVOSAFE® HOT BOX DETECTIVE SYSTEMS • RAILROAD RADIO COMMUNICATION SYSTEMS • 'WHEEL CHECKER' BROKEN FLANGE DETECTOR

**Protected under one or more of the following U.S. Patent Nos.: 2,880,309, 2,947,857 and 2,963,575. Other U.S. and foreign patents pending.*

EDITORIALS

Think Big!

The Southern has in service an experimental 85-ft, 10,000-cu ft box car, a car so long there are skylights in the roof near the ends because the distance from the center doorways is so great. Since the adoption of the 85-ft flat car for piggyback service about three years ago, tank cars, gondolas, and now a box car have been built in passenger-car lengths. The end, figuratively—and almost literally—is probably not in sight. Despite rate regulations which may make it difficult to take full advantage of the high payloads which such high-capacity cars can handle, more and more of them will be built. Inevitably, other types of freight cars will also be built in these lengths.

Such developments mean that those responsible for designing freight-car servicing and maintenance facilities should have a new concept of what a "car length" is. In the future, instead of the traditional 50 ft, car length will probably be 85 ft, 90 ft, or even 100. While a railroad which did not have turntables and backshop facilities for long steam locomotives could choose not to acquire articulated motive power when it became popular, long freight cars will be no matter of choice for car departments. Because of freight-car interchange, all railroads will be confronted with handling and maintaining them. This means that the design of shop facilities should make provision for more than an occasional 85-ft freight car. Jacking arrangements, pits, lighting, and other details should now be laid out to handle such cars on a regular basis.

Another development which should receive consideration is the increased height of freight cars. Some tri-deck automobile piggyback cars have loaded heights well in excess of 18 ft. Some of the wood chip cars also tower well above what formerly would have been considered the maximum clearance limits. Because traffic handled in such specialized equipment has proved profitable, many railroads are making line changes which will permit them to handle high cars over many hitherto restricted parts of their systems. As is the case with the long car, the high car should receive consideration when designing shelters, cranes, lighting, and other facilities necessary for car maintenance. Sufficient overhead clearance should be provided so that these cars can be jacked and lifted when this work is required.

Along with new concepts of car size, provision should also be made for handling heavier running gear. While 90-ton trucks are adequate for the heaviest 85-ft freight car now in service, it is very possible that the 7 x 14 journal and the 40-in. wheel may, in the future, become standard freight-car details. Since the AAR Mechanical Division made the 36-in. wheel mandatory on new freight cars of over 70-tons capacity, a large number of 36-in. wheels have been placed in service. When planning wheel-shop and wheel-handling facilities, provision should be made for machining and moving even larger wheels and axles. At spot repair tracks, it might be well to consider the possibility of servicing six-wheel trucks. When all the potential carrying capacity in the four-wheel truck is exhausted, freight-car designers may turn to the six-wh design for their biggest cars.

A growing number of larger and heavier freight ca will be requiring servicing and repair. Car officers sho be planning for them now. In such planning, there is o one design criteria: THINK BIG!

Concentrated Rail Traffic

With the advent of push-pull suburban trains on the No Western and the Milwaukee, the diesel has appare again encroached on the field of electric operation. T North Western will have 200 cars in service and the M waukee 40. The electrically heated and air-condition gallery coaches have much passenger appeal. Since cars seat up to 162 passengers and the trains may be erated from either end, they are particularly effectiv suburban service. It is the no-turn-around feature t duplicates an inherent advantage of electric traction.

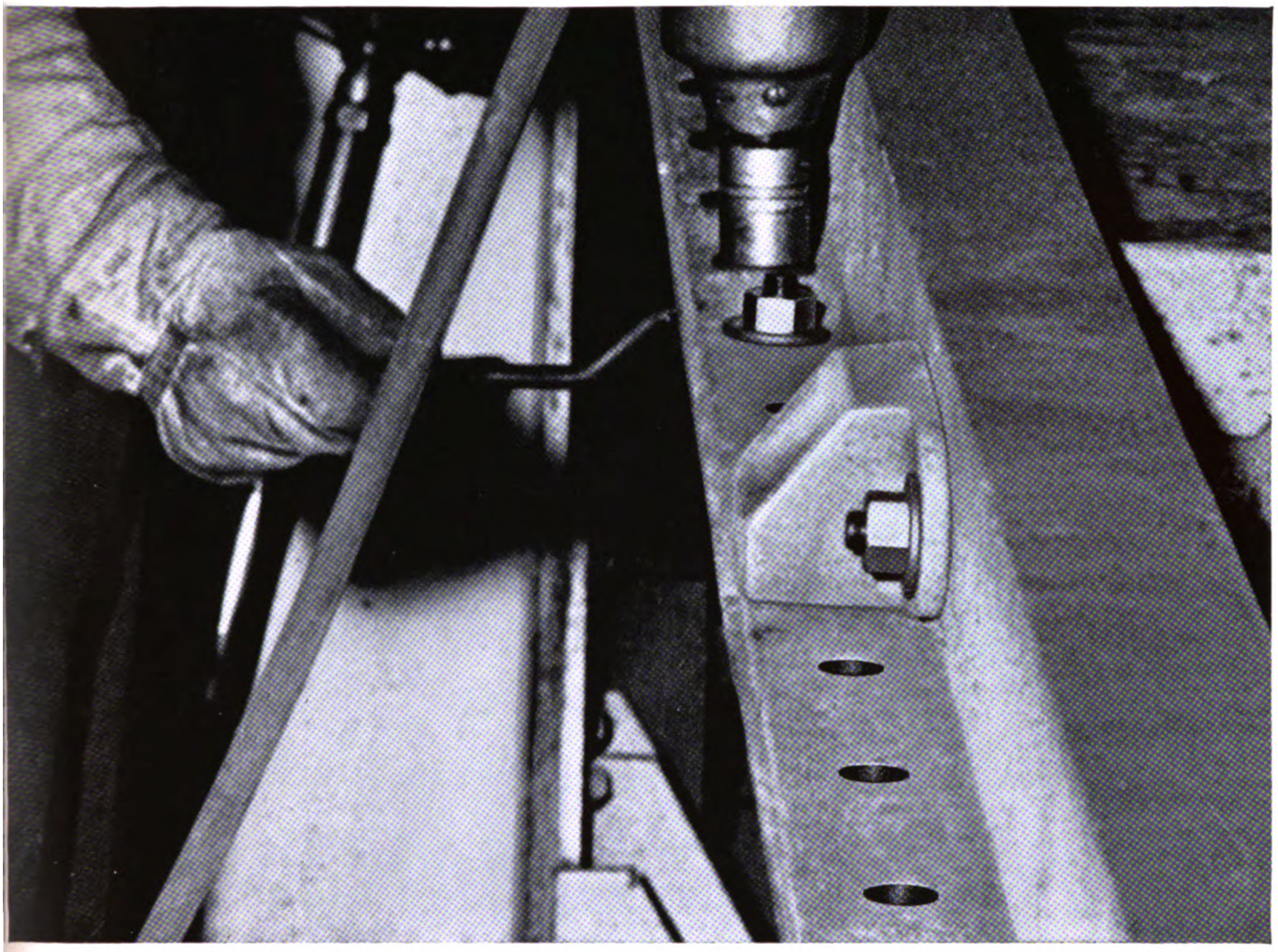
The situation raises the questions of what there is for electric traction and will we ever have more. Orig reasons given by railroads in the United States for elec fying run as follows: eliminate smoke in terminals tunnels; carry traffic over heavy grade sections; impr suburban service; increase capacity with improved ec omy.

Installations of electrification through tunnels to el nate the smoke hazards of steam locomotives have eliminated where the diesel can negotiate the tunnel isfactorily. Similarly, some electrified heavy-grade tions with a change of motive power at each end hav replaced by the diesel.

Rapid transit systems and subways, and some elec suburban service, must operate underground to suc extent that diesel power cannot be used. Present elec suburban service now provides accelerations betwe and 2 mph per sec. This requires a power input of than 5 hp per ton of train weight. As our cities con to expand, the need for electric urban and suburban t port systems will increase.

To increase capacity with improved economy is suc in any business. A number of applications of electri tion in this country still fulfill the definition. New a cations of electrification in other countries are many are increasing. A basic reason is that here in this co we have many privately operated railroads; abroad railroads are for the most part under government co In foreign countries railroads are recognized as a vit of the national economy and the government can ch traffic and finance electrification of heavy traffic li

Government operation of railroads in this country anticipated. Mergers, however, are the order of th and, to be successful, it is almost prerequisite that a must permit an increased concentration of rail traffi it suburban passenger or heavy freight, electric op has proved its capabilities and economic advantage field of heavy traffic.



New idea in car assembly saves shop time—speeds repairs

No matter *how* you assemble cars, you first have to pull the various members together with "fitting-up" bolts. That's where this new idea comes in:

Use RB&W High Strength Bolts for fitting up . . . *and leave them in place permanently.* This cuts idle time of riveting crews.

Now standard procedure prior to riveting certain types of cars in several roads' car shops, this idea eliminates extra operations, saves car assembly time, saves money. These bolts pull the steel together so much tighter, that the riveting job improves, too.

You can do this with high strength bolts because they are stronger than the rivets they replace. All in all, they make a stronger connection that stays tight despite constant rolling vibration and impact.

Of course, by using high strength bolts exclusively at *every* problem area where rivet failure happens too frequently, you stand to gain even more. For example: Bolted hopper cars stay longer on the road. Gondola cars are reinforced much faster. Accessory equipment is more securely mounted. Repairs can be made faster, easier.

RB&W has pioneered in this development for railroad car building and rebuilding, and offers engineering assistance in *where* to use the bolts, and how to install them properly. Consult us for specific details . . . or write for this bulletin. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.



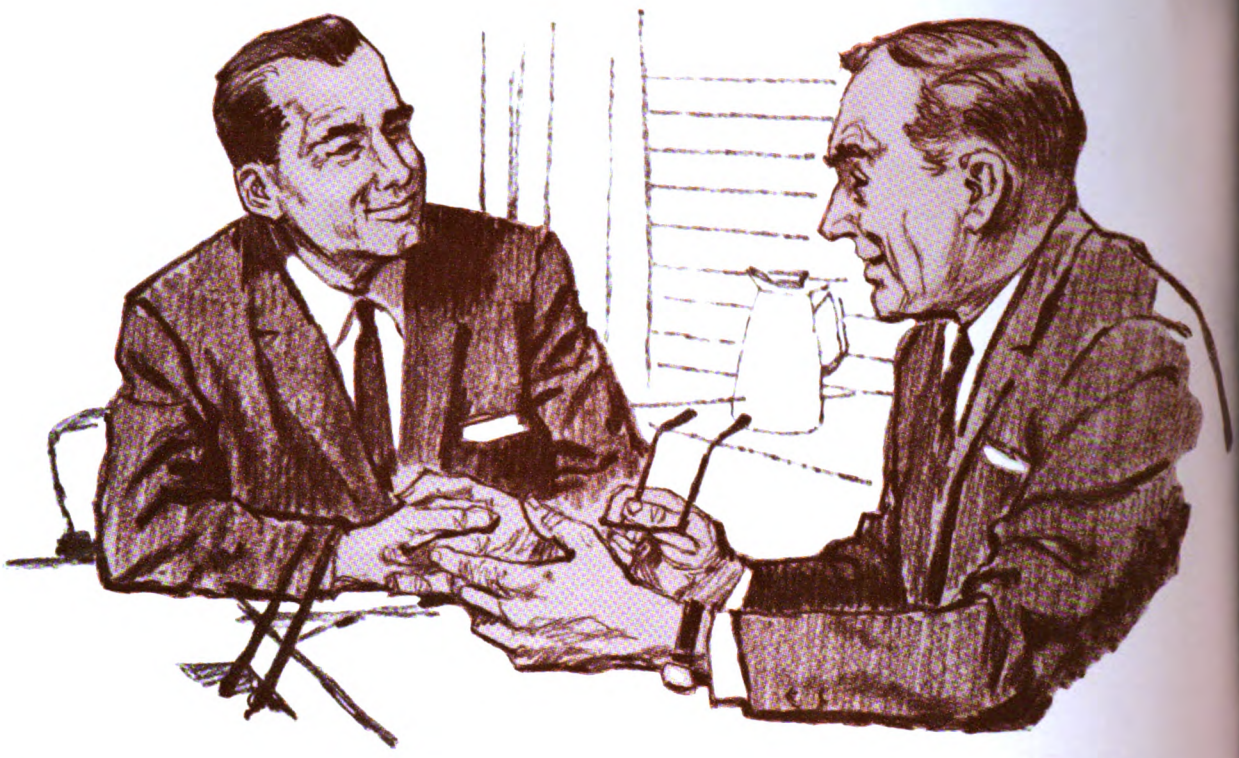
Plants at: Port Chester, N. Y.; Corapolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

The preferred source for high strength bolts . . .



COBRA® SHOE

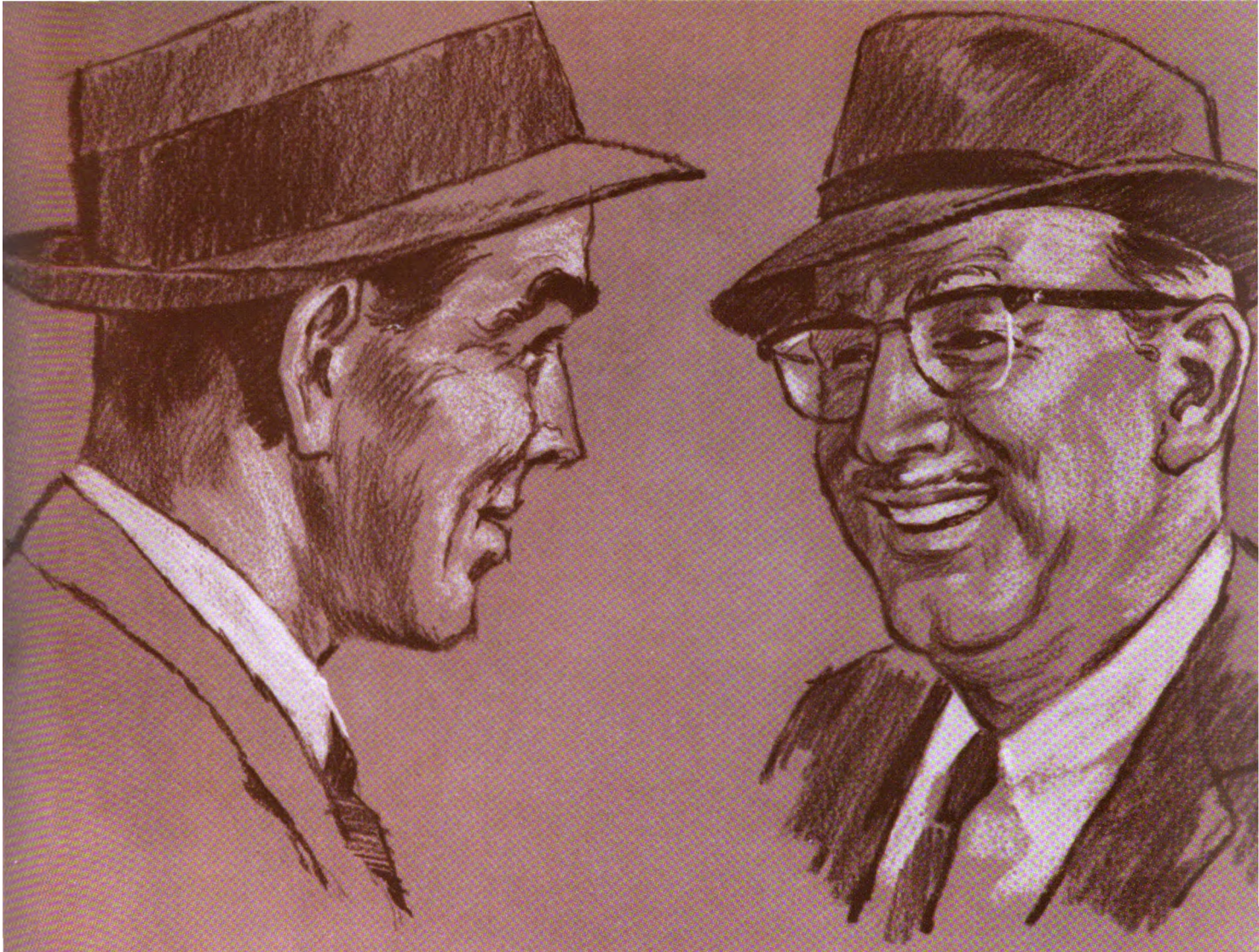
Satisfied users summarize its particularly important advantages



"With all our motive power equipped with Cobra Shoes, our experience has been much better than we anticipated. Wheel life has been extended and we have eliminated wheel damage from braking."



"We have eliminated flat spots and thermal cracking of wheel treads since we installed Cobra Shoes."



"Cobra Shoe life and improved wheel performance have been a major factor in the over-all economies realized in the operation of our new Push-Pull trains."

These typical statements were made by men who have evaluated the important advantages of Cobra Shoes for several years. They're just some of the reasons why more and more railroads are specifying Cobra Shoes for new equipment, and modifying existing equipment to include Cobra Shoes.

Today 158 railroads are using Cobra Shoes on:

Freight Cars	*6086 (2003 Piggybacks)*
Passenger Cars	*2300*
Locomotives	*1164*
Total Units	*9550*

Why Cobra Shoe applications are expanding:

- Cobra Shoes last up to 5 times longer than cast iron shoes
- Wheel life can be doubled when Cobra Shoes are used

The COBRA® Shoe

. . . a product of the combined research facilities of WESTINGHOUSE AIR BRAKE COMPANY, Specialists in Braking; JOHNS-MANVILLE CORPORATION, Specialists in Friction Material



RAILROAD FRICTION PRODUCTS CORPORATION, Wilmerding, Pennsylvania

Oakite adds more POWER to your MANPOWER



Oakite SPEEDET...

The New, Heavy-Duty Liquid Detergent Cuts Railroad Maintenance Costs

Here, now, is New Oakite Speedet—the heavy-duty liquid detergent—designed and developed for the cleaning of running gear, fuel tanks, water tanks and locomotive exteriors.

Economical—you bet! You can dilute Oakite Speedet with water as high as 1 to 40—depending, naturally, on the degree of tenacity of the soils and on the quantity to be removed.

You get a non-tacky, film free surface with Oakite SPEEDET. New soils connot easily redeposit on surfaces that are "SPEEDET" cleaned. Water-mixed Oakite SPEEDET prevents nozzle-clogging of washer sprays because no solids can accumulate or precipitate out in solution tank.

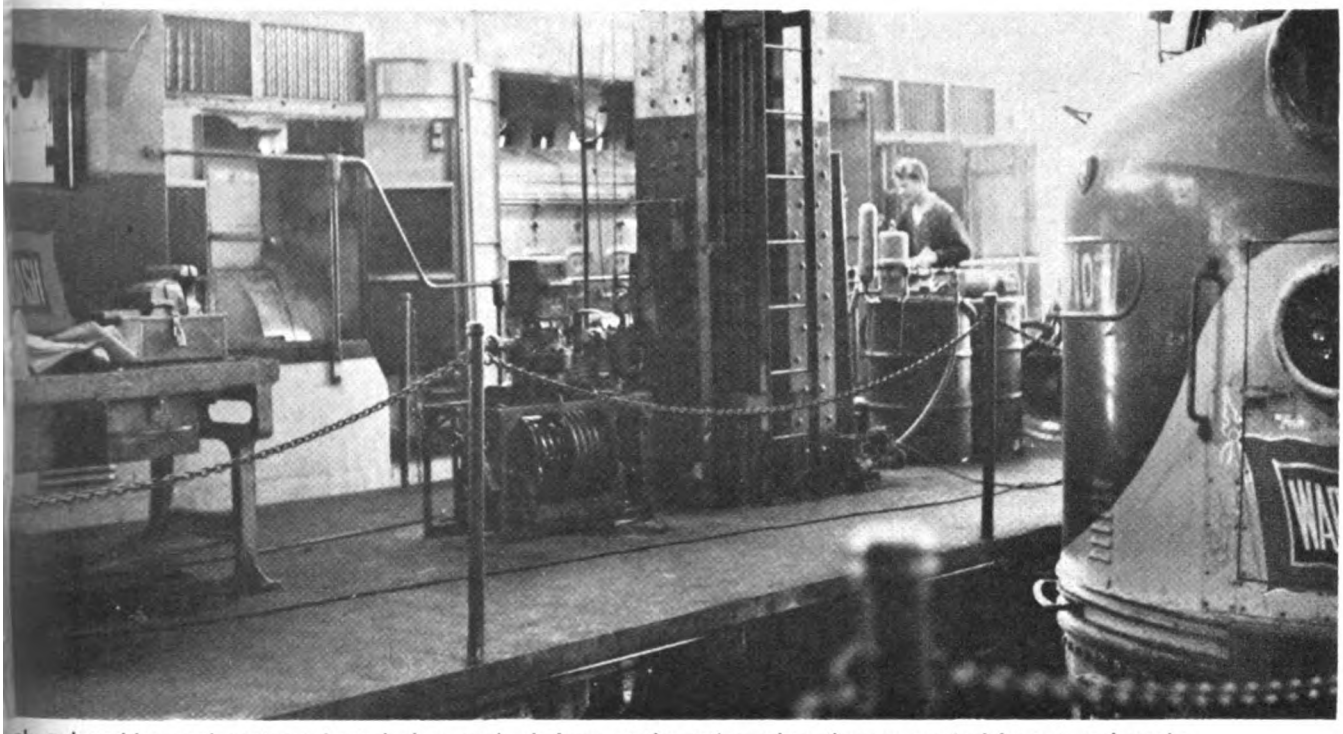
Oakite SPEEDET works well even in cold-water dilutions—and it has excellent rinsing qualities.

When, next, your Oakite man calls on you why not arrange for a test-run on Oakite Speedet? See for yourself with your own set-up. No obligation. And, of course, you can get the complete Speedet story merely by writing Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

OAKITE®

SCIENCE

over 50 Est. 1909 years' leadership in industrial cleaning



ols and servicing equipment are located along work platforms at the stations where they are required for tests and repairs.

Spot' Line Handles Wabash Diesels

Road locomotive maintenance has been centralized; units come to shop twice monthly for maintenance

Wabash road locomotives, with ex-ption of those used on its Canadian es, are now maintained at the rail-ad's principal shop at Decatur, Ill. l this work is being done on a pro-ssive, or "spot," basis. Decatur, ich is at the approximate center of Wabash system, is a key point in freight operations. Freight loco-tives, consequently, can be worked and from this shop readily. Most abash passenger trains also operate ough Decatur, giving the road an portunity to maintain passenger omotives at that point. Decatur p presently handles scheduled intenance for 205 diesel units on a gressive basis.

"Captive" diesel units are no prob-n on their progressive maintenance e, according to Wabash mechanical icers. At the September meeting of the Locomotive Maintenance Officers Association in Chicago one feature of "spot" shop systems which was discussed was that locomotives are "captive" once they enter a line (RL&C, Oct. 1961, p 18). Even if they are found to require unusual repairs, units on the line must continue through the routine maintenance cycle, not always the most satisfactory procedure according to some motive-power maintenance officers.

All units passing through the five-station line at Decatur receive scheduled maintenance and ICC inspections. When it is found that work on a unit cannot be completed while on the line which is Track 4, the unit continues through all five work stations. It is then diverted to Track 2 or Track 5 for needed repairs. If, for example, at Station 2 three power assemblies were found which required replacement, the unit would continue through Stations 3 to 5. It would then be placed on one of the "dead" tracks for this work.

The five-station line, which was put into operation on March 15, has an output of seven units per day with a three-shift operation and an average force of 70 handling both routine and unscheduled repairs. In addition to the 30-day maintenance, each unit also returns after 15 days for additional scheduled servicing. A back-up force supplies air-brake equipment and reworked locomotive components.

While nominally a three-shift operation, normal procedure calls for the seven units to be processed over the progressive line between 6 a.m. and 5:20 p.m. A force of 26 men handles all the ICC inspection and scheduled

maintenance on these locomotives. Three of four men handle the "15-day lubrications" which are worked on a separate track. Because each unit is scheduled for this 15-day lubrication just 15 days after its monthly maintenance, seven units also arrive in Decatur for this servicing each day.

The locomotive work program is based on a master maintenance schedule, applicable to any month and anchored on annual inspections. The schedule lists the ICC date for each of the 205 locomotives presently assigned. No more than two annuals are scheduled for any one day because of the heavy volume of air-brake work necessary on six-month and annual inspections.

Tracks 1, 2, 4 and 5 in the shop are equipped with the conventional arrangement of elevated and depressed platforms and track pits. Track 1, a through track, is assigned for the "15-day lubrication" of road units. This servicing is done 15 days after the monthly ICC inspection. It involves the following: check of oil in traction motor bearings, change of car-body filters, check of engine oil and batteries, application of brake shoes, renewal of traction-motor brushes, and making of minor repairs. Stub track 2 is the "dead" track where unscheduled repairs are made to units after they pass through Track 4, the progessive repair line.

Wheel Work

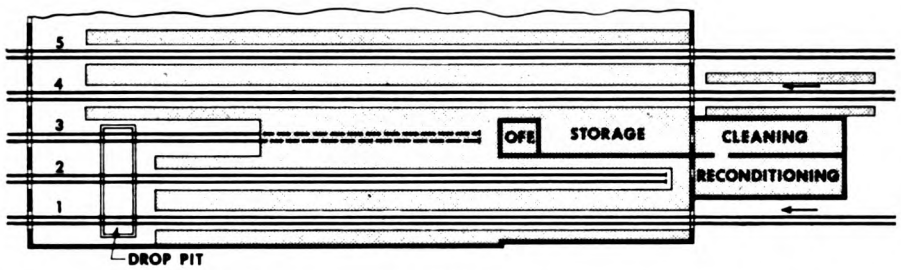
Stub Track 3 is equipped with a drop table and serves also as a storage track for spare trucks. A new 30- x 140-ft building at the west end of this track houses a recently installed wheel-truing machine. Units are routed into and out of the building from the west end. Tracks 4 and 5 are through tracks with Track 4 being the progressive line and Track 5 designed for heavy repairs and unscheduled maintenance.

Track 4 has five stations for handling scheduled maintenance and ICC inspections. At each station a predetermined amount of work is done in one hour before the unit is advanced to the next station. Station 1 is outside the east end of the shop. Stations 2, 3 and 4 are inside. All mechanical inspection and testing is done at Station 2 and electrical work at Station 3. At Station 4, the engineroom and cab are cleaned. Final inspections are performed at Station 5 outside the west end of the shop. Here the engines are started, air brakes checked, and the unit loaded. If the unit then requires any unscheduled work, it goes to either Track 2 or 5.

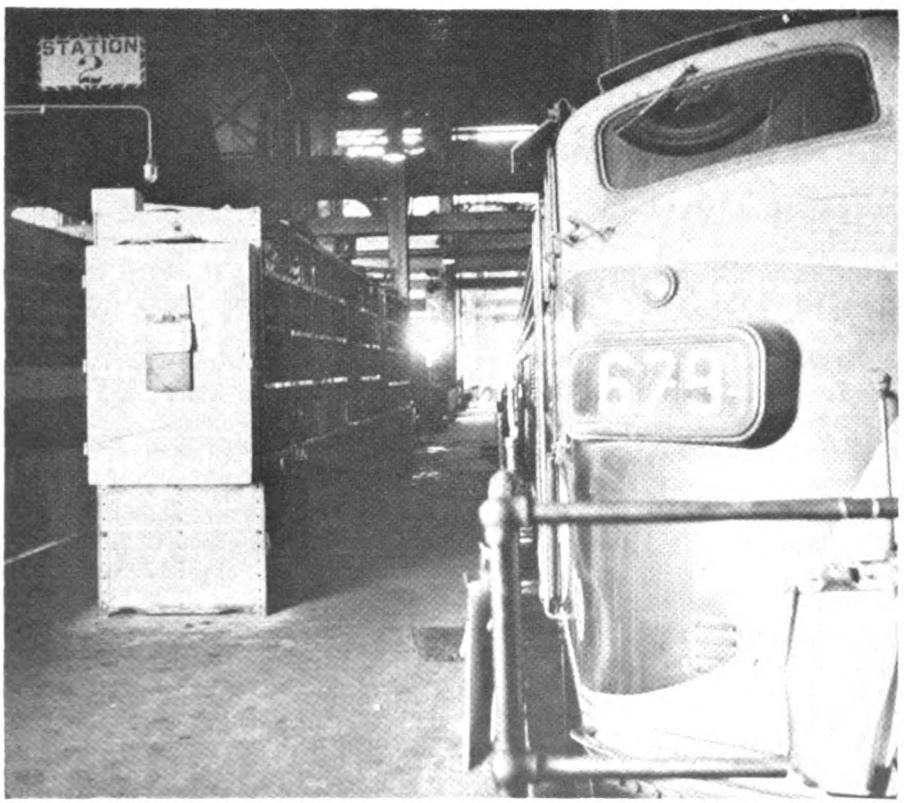
Station 2 is completely equipped for servicing of mechanical components. Lubricants are piped along the track at this station. Inside the south rail are an Alemite line and a 1¼-in. oil line with six outlets, spaced at 10-ft intervals, for servicing journal boxes and traction-motor support bearings. Engine lubricating oil is piped through three meters on the upper platform. Under the platform between Tracks 4 and 5, are water and air lines. Lubricating oil drain pipes extend through the pit, and the used oil can be pumped to the oil house.

Materials and tools necessary for the operation of Stations 2, 3, and 4 are placed along the upper platform of Tarck 4. Material racks are checked weekly and replenished by the stores department. Slower moving items are stored between Tracks 2 and 3 on the upper level.

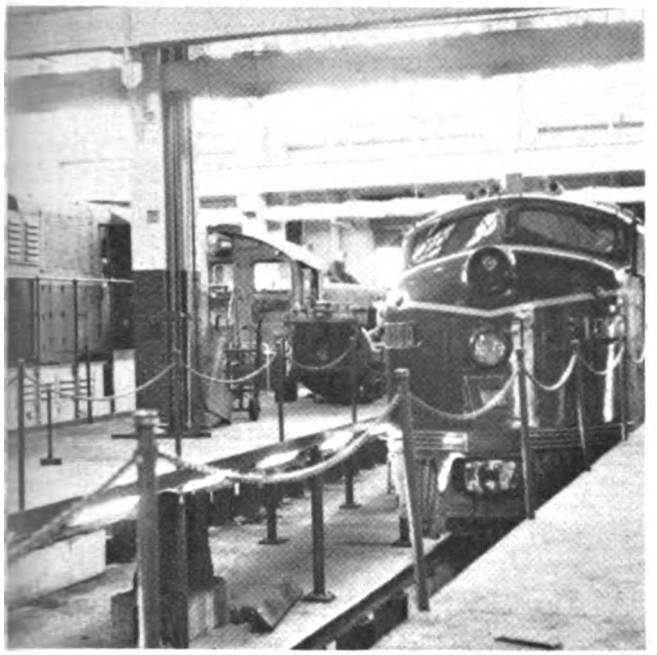
Track 4 operations start at 6 a.m. with third-trick personnel when the first unit is placed at Station 1. By 7 a.m. the first unit is completed and leaves Station 5. Other units by then are being worked on at Stations 1 through 4. Lights and horns along the track operate for five minutes prior to moving the line, signalling that units are to be moved. Locomotives are spotted at the work stations by a device which moves several units simultaneously by powering a traction motor on one unit from its batteries. This locomotive and those it is spotting can be stopped by reversing the



Progressive repair line has been set up on Track 4 in one end of locomotive shop. Extensions had previously been added to this building so multiple-unit diesels could be handled.



Parts storage racks are located adjacent to locomotive repair stations. Fourteen units are scheduled to come into Decatur locomotive shop for preventive maintenance each day.



evated and depressed work levels have proved to be valuable features the progressive repair lines.



Truck repair track is arranged so completed trucks can be stored under elevated platform at rear center awaiting use.

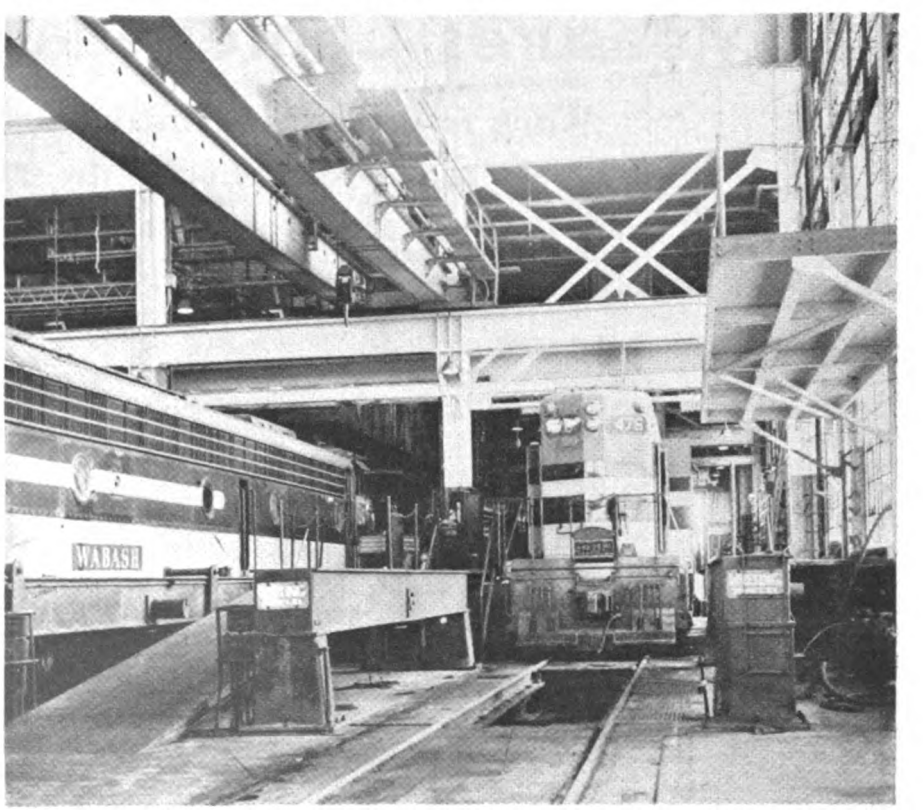
eld of the traction motor. The spotng device may be operated by any of ıe shop crafts.

All work scheduled for the stations ırries numerical designations. Each ıan does a predetermined amount of ork at each station on each unit, ased on an assigned work schedule. he schedule lists the regular monthly ems and additional quarterly, semiınual, or annual maintenance and spections for which the unit may be ue. It is in effect at the start of the st shift, and the assignment conıues until the last unit passes rough the stations. For example, hedule M-125 is a machinist workg at Stations 1, 2, and 5. M-1-A is machinist working only at Station 1 ı the line.

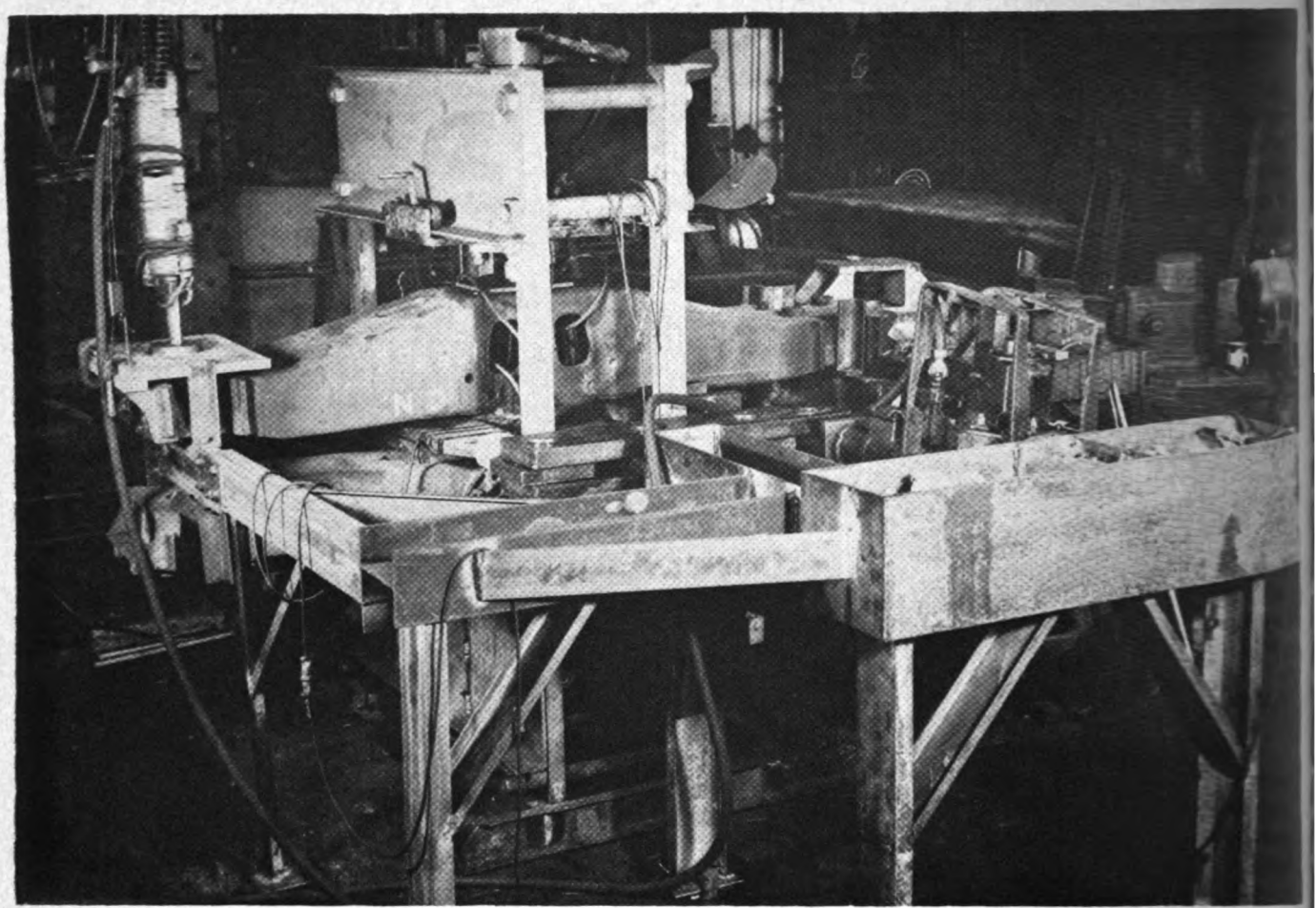
Work schedule sheets are kept at e east end of the shop between racks 3 and 4. Attached to a clipoard and placed on each unit at Staon 1 are a master sheet, work schede, the engineer's work report, the ıttery record, wheel report, leadading card, and other necessary rms. The clipboard and forms reain with the unit through all staons. The workman assigned is quired to sign the master sheet for e work opposite his schedule when is completed.

All types of locomotives are haned over the progressive track. When e line went into operation, 123 units ere maintained at Decatur. These cluded 19 Alco road freight and ıssenger locomotives, eight Fairbanks-Morse road switchers, nine EMD road passenger units, 14 EMD road switchers, 59 EMD road freight units, and 14 switchers. On May 1, an additional eight EMD road passenger units were assigned at Decatur. On July 1, 33 more EMD road freight and road switcher units were transferred there from the Montpelier, Ohio, enginehouse. An additional 40 EMD road units started coming to Decatur for maintenance on July 16. These had previously been maintained at Moberly, Mo. This brought the total to the present 205 units.

Motive power on the Buffalo Division, extending across Canada from Detroit to Buffalo, continues to be maintained in Canada. Motive power on that district includes 22 F7 units, one GP7, and six switching locomotives.



Road switcher at center is coming through Track 1, the "15-day" line. When units must be set out for wheel work or other unscheduled repair, they go on adjacent track.



Testing machine, built by Canadian National, makes it possible to vary load, rotate the center plates, and vibrate them to simulate operation.

CN Measures Center Plate Friction

Work is aimed at finding proper surface treatment or a better lubricant for this important bearing

By W. H. Cyr

Reduction of center-plate friction in freight cars could cut center-plate wear; make it easier to maintain side-bearing clearances, and reduce flange wear on the wheels. The Canadian National is conducting tests to determine, under laboratory conditions, the friction forces between body and truck center plates under various center-plate surface and lubrication conditions.

Certain railroads have adopted center-plate lubrication more elaborate than the greasing required by interchange rules. Some roads have specified that all center plates should be machined and lubricated with molybdenum disulphide or grease. Other railroads have specified that new center plates should be sand-blasted and lubricated with a 50-50 mixture of varsol and molybdenum disulphide. To date, the CN laboratory has determined that greases and free molybdenum disulphide do not last long enough to give satisfactory lubrication.

From a paper presented by Mr. Cyr, chief mechanical engineer, Canadian National, before the 1961 ASME Winter Annual Meeting.

Center Plate Lubrication

If there were no economic considerations, a very satisfactory center-plate bearing could be designed—one having long life and very low coefficient of friction. Such a bearing could be used on new cars and, conceivably, might be applied to freight cars already in service. The present bearing is very crude and relatively inexpensive. If it is advantageous to reduce center-plate friction, an ideal solution would be to find a suitable lubricant for the bearing as it is now built.

It is, indeed, quite possible that road tests will show that low center-plate friction increases wheel-flange wear and promotes excessive shimmy in service. In order to determine whether lubricated center plates are desirable or not, however, a satisfactory method of lubrication must first be found.

The CN tests involve rotating of truck and body center plates one against the other and measuring the torque required for rotation. This is

done under varying loads and with different types of lubrication.

Two truck bolsters with integrally cast center plates are used. These bolsters, placed one on top of the other, are clamped to prevent horizontal movement. Two body center plates welded back-to-back, are placed between the fixed bolsters. The center plates used in the initial tests had been removed from cars in service and were worn. A vertical load is applied on the bolsters by a hydraulic ram, and the center plates between the bolsters are rotated by an air-operated jack. When tests are made requiring a large number of reversals of rotation, the air jack is replaced by a double-acting pneumatic cylinder and piston. This cylinder has been equipped with limit switches to automatically reverse piston motion. The machine can be operated for long periods without attention.

Vibration Effects

An attempt was made to vibrate the center plates while the torque was being measured. This was done by impacting the top bolster with an air hammer. While no attempt was made to reproduce the type of vibration imposed on the center plate in service, some idea of the effect of vibrations on the friction was obtained.

The test program first obtained torque measurements for the center plates in the condition in which they were found in service and after being lubricated with a 50-50 mixture of molybdenum disulphide and varsol. The center plates were then machined to a 120-microinch RMS surface finish and new torque measurements obtained under unlubricated and lubricated conditions. Following these tests, another set of center plates was removed from a car in service and lubricated with molybdenum disulfide. The change in coefficient of friction of lubricated center plates after a large number of rotations of the plates was investigated.

Results obtained during the initial test have shown the differences which might be expected in torque and coefficient of friction with various center-plate conditions. If low frictional resistance is required, the greatest advantage is to be gained by lubricating unmachined center plates. Lubrication with molybdenum disulphide reduced the coefficient of friction of machined center plates from 0.34 to 0.06. Under a 25-ton load, the torque was reduced from 6,927 ft-lb to 1,327 ft-lb. Lubrication of the machined center plates reduced the coefficient of friction from 0.12 to 0.11 with a corresponding torque reduction from 2,450 ft-lb to 2,200 ft-lb under a 25-ton load.

The 0.34 coefficient of friction of an unmachined and unlubricated center plate reduced to 0.12 after machining. The unlubricated, machined center plates tended to plough and tear severely, making them unsuitable for service. The lubricated, unmachined center plates had a coefficient of friction of 0.06, while the lubricated machined center plate had a coefficient of friction of 0.11.

Rotation Studies

When there was no vibration, the coefficient of friction remained approximately constant irrespective of the load. When vibrated, the coefficient of friction decreased slightly as the load was decreased from 50 to 12 tons. The decrease was of the order of 0.04.

Having found the coefficient of friction which could be obtained with molybdenum as a lubricant, tests were then carried out to determine what effect a large number of reversals of rotation would have on the lubricating qualities of this material. The frequency of reversal of center-plate rotation on a freight car in service has been measured at 2 cycles per min on tangent track. It was decided to test the endurance of molybdenum disulphide for 72,000 cycles, which is equivalent to about six months of continuous service.

Although molybdenum disulphide produced a low coefficient of friction when it was first applied, the coefficient increased with the number of cycles of center-plate rotation. Several tests were made showing that a sharp increase in the coefficient could be expected after 12,000 cycles of rotation. It was determined, however, that the life expectancy of molybdenum disulphide was too short to justify its use.

Other methods of lubrication were then tried. These involved greasing of the center plate, inserting a disc-type liner between the male and female plates, and bonding a coat of graphite on the male center plate. With the center plate lubricated with a good grade of grease, the coefficient of friction increased gradually until the coefficient of the unlubricated surfaces was reached. The test was then discontinued.

Disc-type liners of various thicknesses having an outside diameter slightly less than that of the female portion on the bolster and with a 3-in. hole in the center were tested. These liners were made of different materials, such a compressed graphite, nylon, babbitt-molybdenum-disulphide composition, and asbestos weave impregnated with graphite. Due to the slight lateral movement between the center plate and the bolster, the thin liners curled around the outside edges and the center hole was torn. The thicker liners did not curl around the outside, but the center hole was torn and the bearing surfaces were galled more than was the case with the thin liners. Rapid deterioration of the liners under load resulted in high coefficients of friction, and the tests were discontinued. At present, tests are being conducted with lubricants, such as thermo-setting graphite, bonded to the center plate.

Mechanical Division Position . . .

"Proper lubrication of center plates has continued on the docket for a considerable time. While a number of railroads have tested different materials, nothing [specific] has been developed. Materials [have been furnished] for use on center plates that were definitely of no value; in some cases were detrimental to proper lubrication. A subcommittee has been appointed to study this matter, and it is hoped that shortly a specification for a proper lubricant for center plates will be produced." *From the report of the Committee on Lubrication of Cars and Locomotives presented at the 1961 AAR Mechanical Division meeting.*

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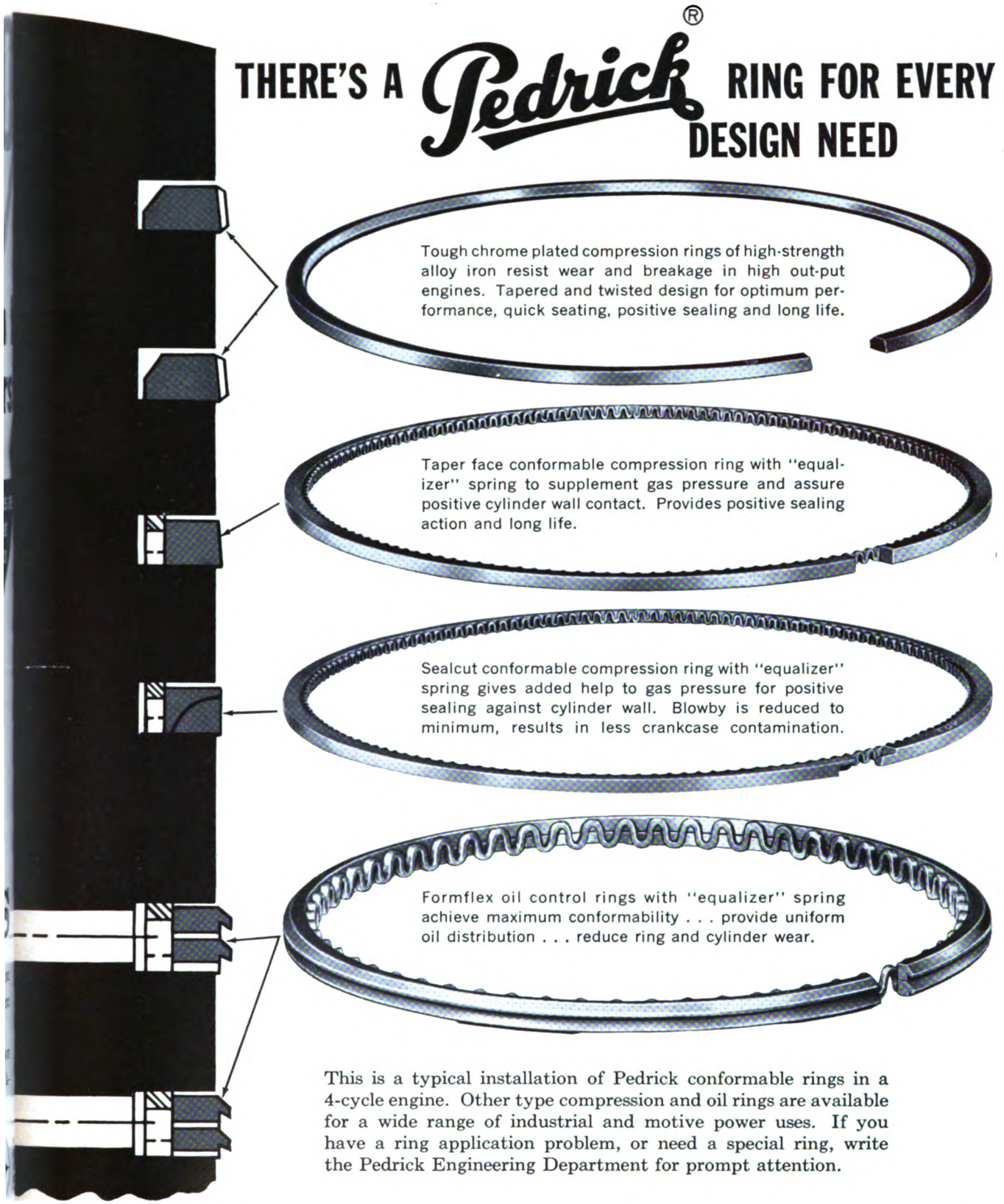
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Taper face conformable compression ring with "equalizer" spring to supplement gas pressure and assure positive cylinder wall contact. Provides positive sealing action and long life.

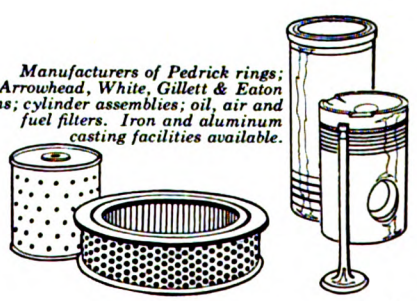
Sealcut conformable compression ring with "equalizer" spring gives added help to gas pressure for positive sealing against cylinder wall. Blowby is reduced to minimum, results in less crankcase contamination.

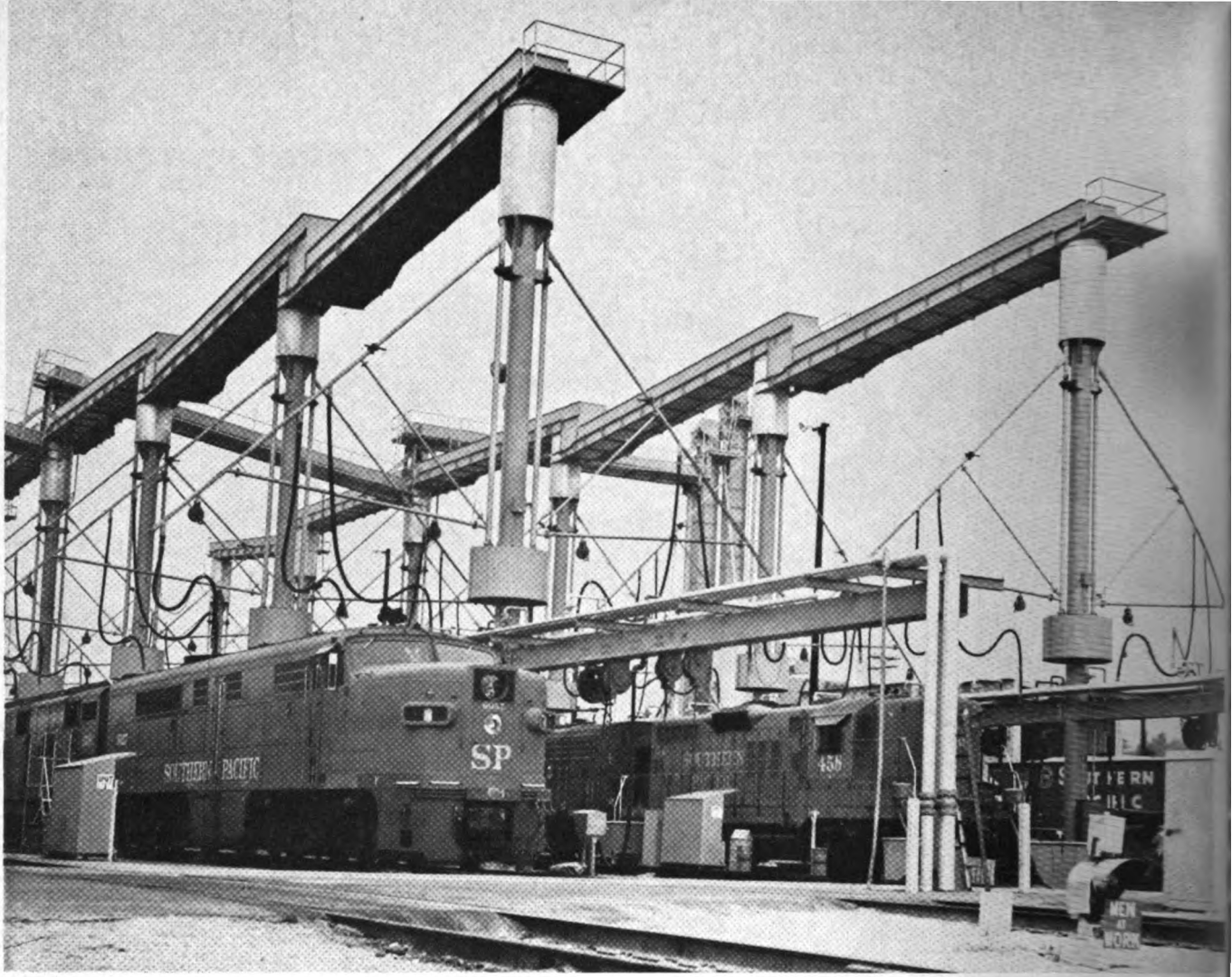
Formflex oil control rings with "equalizer" spring achieve maximum conformability . . . provide uniform oil distribution . . . reduce ring and cylinder wear.

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Sanding towers are located at unit-length intervals between pairs of tracks so that six units may be serviced simultaneously.

Southern Pacific 'Launching Pad'. . .

Facility Handles 200 Units Daily

Designed to apply line production techniques to diesel locomotive servicing, the new Southern Pacific facility at Taylor Yard in Los Angeles has been nicknamed "The Launching Pad" because of its space-age appearance.

Most prominent features are the 13 five-story high sanding towers. In addition to the high capacity sand handling equipment, specialized facilities have been installed for cleaning, inspecting, and fueling the 200 diesel units which are serviced during an average 24-hr period at Taylor Yard. According to J. K. Edwards, SP Los Angeles Division master mechanic, the facility has the potential capacity to service up to 400 units daily.

There are 4½ miles of approach track and five 350-ft long one-spot servicing pits. These servicing tracks handle six-unit locomotive consists without extra switching. Each locomotive passes through a wash rack which cleans in a three-cycle operation. The approaching diesel first trips a preliminary rinse switch, then another which applies a special detergent solution, and, finally, one which triggers a final rinse through 800 psi spray nozzles.

Under normal traffic conditions, approximately 80,000 gal of diesel fuel daily fill the tanks of the 200 units serviced. Sand consumption during a week runs about 120 tons, although this figure varies with weather conditions. Three types of water are dispensed through overhead hose reels to fill varied requirements: raw water for general uses, soft water for steam-heat generators on passenger locomotives, and treated water for use in diesel-engine cooling systems. All fuel, water, and sand hoses are located so a locomotive need not be moved once it has moved in for servicing.

Another time-saver is an intercom system with hi-level paging speakers and low-level talk-back speakers which enable foremen to communicate with all personnel.

Typical of the materials used in construction of this facility are more than 10 miles of pipe and conduit in the superstructure, 5,000 cu yd of concrete in the foundation, and 3,300 tons of structural steel.

The SP has also been a pioneer in developing line methods for preventive maintenance and inspection of locomotives. Its first such diesel shop was established at Ogden, Utah (RL&C, Dec. 1960, p 23). The Sacramento, Cal., shop has also been rearranged for spot maintenance.

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The Revolutionary GENERAL MOTORS GP-30

The Revolutionary GP-30 . . . a new 2250 horsepower combination high-speed, heavy-drag general purpose locomotive . . . thirty major advancements . . . a new concept of locomotive reliability . . . dramatic savings in operation and maintenance . . . the single most important motive power development since introduction of the first Diesel powered FT locomotive in 1939 . . . offering the greatest return on investment in the history of American railroading.

Widest range locomotive on the rails, the GP-30 extends operating range 21½% over Model GP-20 . . . provides 12½% greater capacity for high speed operation as well as drag on grades . . . operates in a mixed consist with lower horsepower units with no reduction in the capabilities of either locomotive . . . maintains adhesion over the entire range with a new wheel slip and load control system. (For example, at 12 miles per hour, the continuous tractive effort is 50,000 pounds, a 21% improvement based on 71 miles per hour top speed.)

Advancing the trend established by earlier General Motors locomotives, the GP-30 dramatically reduces maintenance and operating costs. Advances are measured in terms of the D-22 generator (service life has been extended 50%) . . . the advanced central air system which eliminates car body filters and provides ambient filtered air to all components that use air . . . a new secondary engine filtering system requiring maintenance only once each year . . . the rugged air compressor capable of running at 100% load factor with maintenance intervals extended one year . . . lube oil filters that go 60 to 90 days between changes . . . and up to 10½% improvement in specific fuel consumption over the Model C engine.

Increased capacity of the GP-30 permits operation of present freight schedules with fewer units—two GP-30's replacing three older units on most operations. (And the new GP-30's will pay for themselves within four years when purchased through the Electro-Motive Locomotive Replacement Plan, offering 25% greater economy than the GP-20, protecting the railroad's equity in older motive power).

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS
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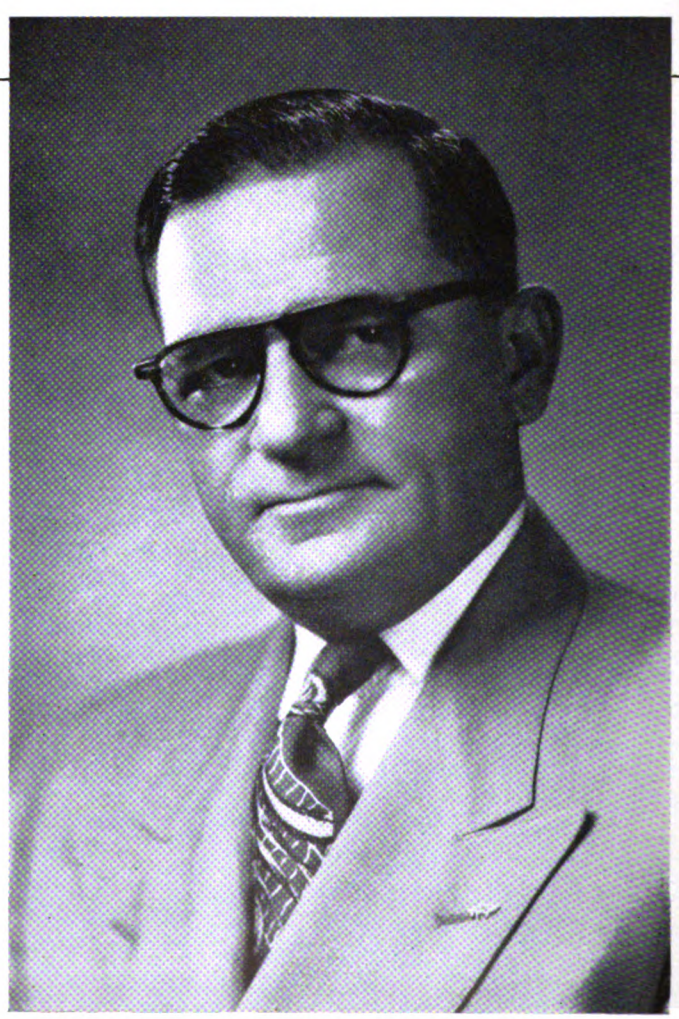
GENERAL MOTORS LOCOMOTIVES


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"We find Railway Locomotives and Cars a very useful medium . . ."

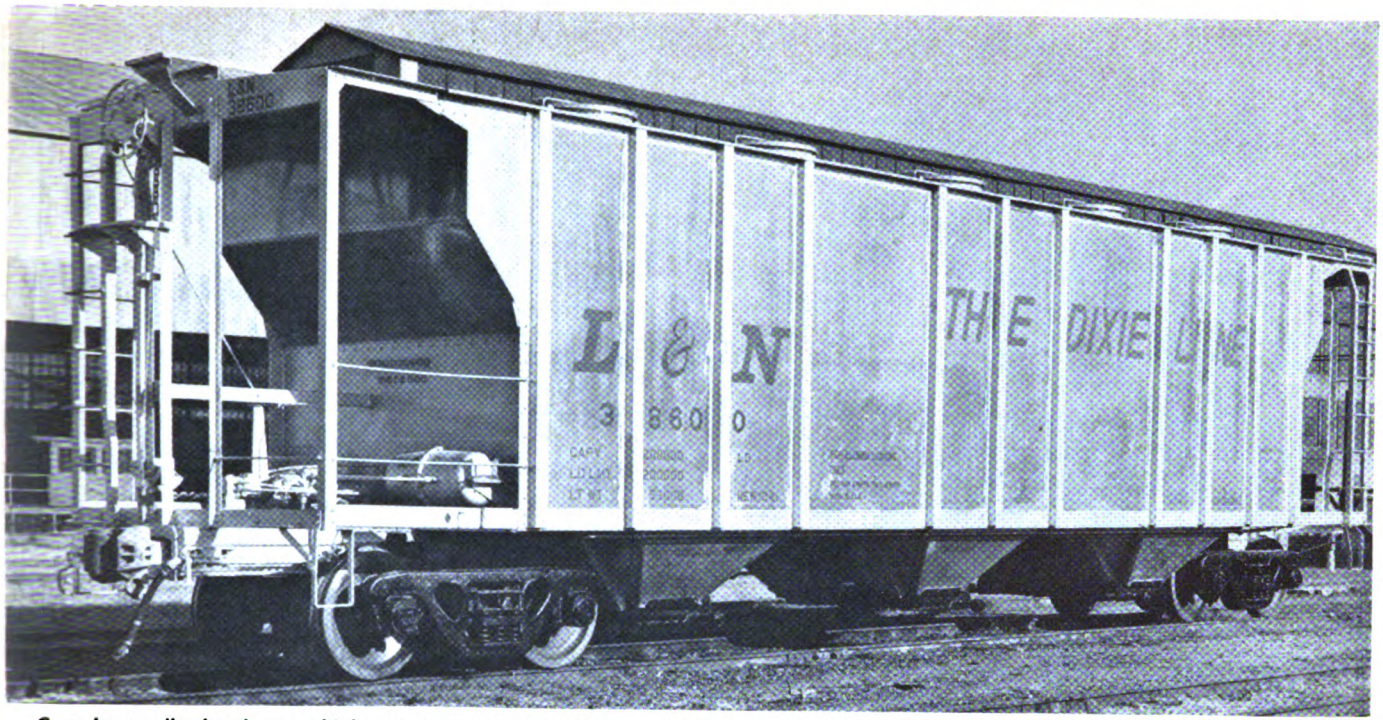
"We of the Mechanical Department on the Missouri Pacific find Railway Locomotives and Cars a very useful medium for obtaining information on a great variety of subjects related to our work and problems, including well illustrated news stories about what other roads are doing and about new developments in design and maintenance of railroad equipment. Special features dealing with maintenance problems are always educational and helpful."

O L Hope



MISSOURI PACIFIC LINES

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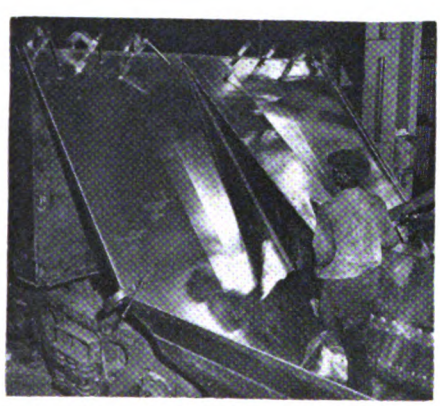
Cars have roller bearings, multiple-wear wrought-steel wheels, and 2 ½-in. travel springs. Use of aluminum reduces weight over 10,000 lb.

Aluminum Covered Hoppers for L&N

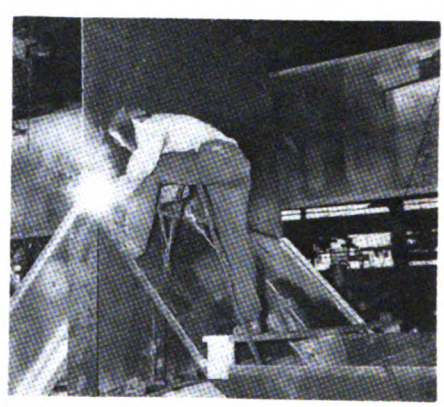
Hundred-ton, all-welded covered hopper cars, based on the PS-2 covered hopper design, are being built by Pullman-Standard for the Louisville & Nashville. Designed for handling alumina from Mobile, Ala., to Alcoa, Tenn., the car body is constructed of 10,500 lb of Alcoa aluminum alloy 5454 plate, extrusions, and castings. The car's light weight is 53,000 lb—10,000 lb lighter than comparable all-steel cars. The 40 cars are being built at the Pullman-Standard plant in Birmingham, Ala.

The center sill is made of two steel 51.2-lb AAR Z-26 sections. End posts and underframe members are copper bearing steel. The two end roof sections are also steel.

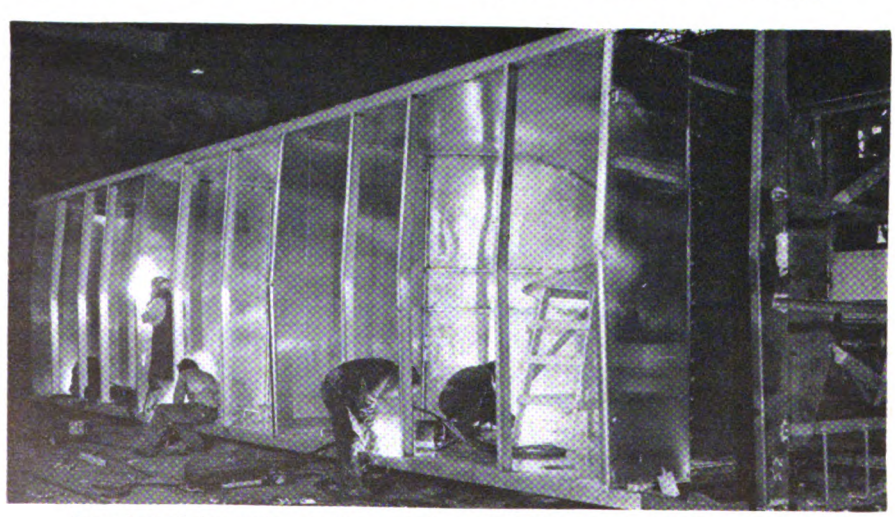
Side sills are 6- x 3½-in. aluminum angle extrusions, and side plates are bulb-angle extruded sections. Aluminum plate, 5/16 in. thick, is used for all body sheets, except the outside hopper sheets which are 3/8 in. and the intermediate roof sheets which are 3/16 in. thick. All 18 side stakes and the eight carlines are aluminum channel extrusions. Partitions are flanged to form additional roof supports. The cars have ten circular hatches with 30-in. diameter cast-aluminum hatch frames and 3/16-in. covers.



Body parts contacting lading are all heat resistant 5454 aluminum. Alumina is loaded hot.



Body is an all-welded structure. Design corresponds to the conventional PS-2 car.



Capacity is 3,506 cu ft.; length over strikers 41 ft ¾ in.; height 13 ft 11-3/16 in.

Wilson Car Lines Findings . . .

Uneven Braking Affects Wheel Wear

Freight-car wheels may not wear uniformly because of the unbalanced braking forces which apparently exist in standard freight-car trucks. This conclusion has been reached following nearly four years' operation of 400 Wilson Car Lines refrigerator cars, during which brake-shoe replacement patterns have been carefully determined. Two years ago Railway Locomotives and Cars carried the first report on this investigation (Sept. 1959, p 57).

J. R. Jennings, general manager of Wilson Car Lines, last month told the ASME Railroad Division that "attention is naturally directed toward the brake rigging. Brake rigging has always been subject to compromise. The truck design with the rod under the bolster has involved increasing maintenance as train speeds increased."

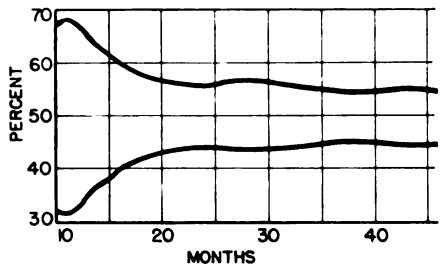
Larger capacity cars and longer spring travel brought clearance problems which resulted in a modification of the "rod under" design to a "rod-through-the-bolster" arrangement. It has been known that this design is unsymmetrical and produces unsymmetrical forces tending to rotate the brake beams in a counterclockwise direction in a horizontal plane.

The effect is a crowding of the L-1 and R-2 brake shoes into the flange portions of those wheels, with the mate shoes being moved toward the rims of the R-1 and L-2 wheels. This, however, is not necessarily the sole cause of uneven brake shoe and wheel wear. "A review of the design, standards, and specifications of all items appears to be in order," Mr. Jennings said.

The standard method for designating wheel locations on cars is to number the axles from the handbrake end of the car and to designate right and left while facing the exterior of that end. This produces designations R-1, L-1, R-2, L-2, etc., which are used in describing brake-shoe replacements.

A summary of brake-shoe replacements would apparently indicate:

- Wheel wear is probably associated closely with the pattern of shoe replacements; this cannot be substantiated fully on the basis of information now available.



Brake-shoe replacements at four "high" positions have consistently run higher than the replacements at the four "low" positions.

- Approximately 10% more brake shoes are replaced at the four positions L-1, R-2, L-3, and R-4 than at the four mating positions.
- Approximately 9% more shoes are required at R-2 and L-3 than at the mate locations and approximately 12% more shoes are required at L-1 and R-4 than are required at the mate locations.
- Braking forces apparently do not act through the wheel center lines and are the most probable cause of this shoe replacement pattern.

"This does not imply that any particular component or the equipment design is the primary cause of these results," Mr. Jennings commented.

A study of brake-shoe replacements was originally initiated to determine the service that would be obtained from AAR cast-iron brake shoes on 400 WCLX refrigerator cars which were approximately 10% heavier than earlier cars. The cars, built in 1957, were equipped with standard AB brake equipment and brake rigging, No. 18 unit brake beams, and 1½-in. cast-iron shoes, all typical of standard freight-car equipment. Two hundred cars were equipped with cast-steel wheels and 200 with one-wear, wrought-steel wheels. Shoe replacements are recorded on each car showing the wheel location, month replacement is made, and whether work is done by a railroad or Wilson forces. Because the location of shoe replacements is not required on interchange bills, complete information is not available for all of the brake shoes replaced by railroads.

Of the 9,237 shoe replacements, locations were not identified for 17.2%. While complete information on the unidentified replacements might cause some adjustment in the results, it has been assumed that the identified replacements are representative. There is no clear indication that shoe replacements on cast-steel wheels differ appreciably from replacements on one-wear wheels.

Usually brake shoes are replaced one shoe at a time. Even though this meets Interchange Rule requirements Mr. Jennings feels that it may not be economically and operationally desirable. If shoe wear were uniform enough to make possible brake-shoe replacements in complete car sets, it would seem to offer potential economies. Studies by Wilson Car Lines of its AAR bills and its own shopping costs indicate that, in some months, 7 to 90% of the total cost of maintaining 4-yr old refrigerator cars involves brake-shoe replacements. This should provide sufficient incentive for an evaluation of the present brake arrangements, Mr. Jennings said.

Establishing a relationship between wear of wheel treads and flanges, and brake-shoe replacement patterns has not been easy. There is no standard procedure for determining wheel wear at the tape line on the tread and in the throat of the flange, points which fix wheel condemning limits. Measuring tread and flange contours to determine wear is not completely satisfactory but seems to be the best available method for obtaining wear patterns. Any factor producing unequal wear on equal tape-size wheeels soon changes the circumferential measurements. This can happen when lateral movement of a brake beam thrusts one shoe against the flange of one wheel and moves the other shoe toward the rim of the mating wheel. Once a difference is established, all factors combine to accelerate the wear rate.

Wheel contours obtained from several cars in the test group give reasonably conclusive evidence that the wheels in the positions where there is a high rate of shoe replacement will be the first to wear to the condemning limits. As would be expected, for example, the wear rate on L-1 and R-2 wheels is usally faster than on the R-1 and L-3 wheels.



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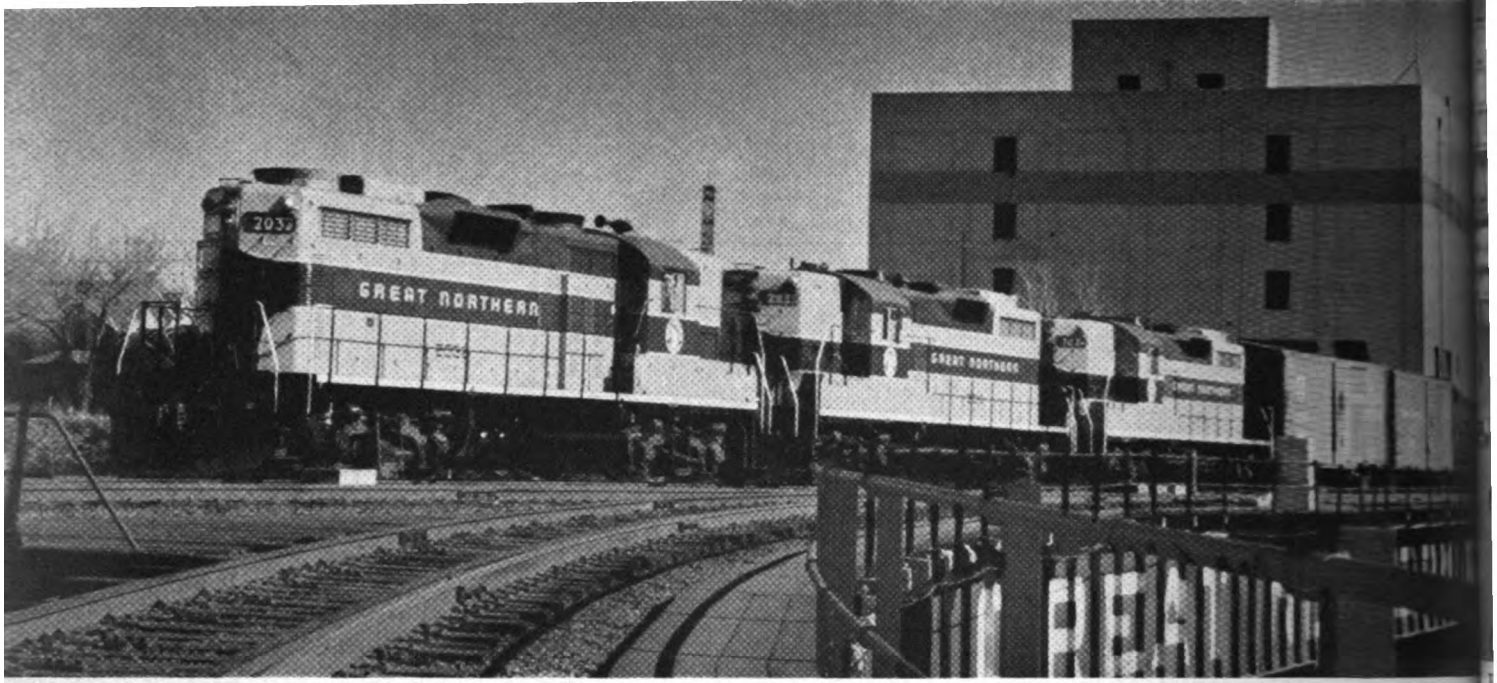
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GP-20 diesels like these three were used in tests showing performance of slip suppressing brake on locomotives in multiple unit control.

GN Tests Slip-Suppressing Brake

Single-unit and multiple-unit operations have proved effectiveness of air brake control of wheel slipping

Correction of locomotive wheel slip with automatic light brake applications has proved to be an effective method for improving freight-train handling and locomotive performance. This was the conclusion of the Great Northern mechanical department following four months' testing of a GP-20 fitted with the New York Air Brake pneumatic wheel-slip-control system and after a 1,900-mile test run when three units with the NYAB equipment were operated in multiple. The GN plans to equip more locomotives with this control system during 1962.

Suppression of wheel slip on locomotives with an air-brake application is not an entirely new idea. On steam locomotives some enginemen would initiate a light independent brake-valve application when drivers slipped. In recent years a manually operated "anti-slip" brake has been employed on single-unit electric locomotives in Europe (RL&C, January 1957, p 46).

Higher horsepower ratings of diesel-electric locomotives for high-speed freight service complicate the wheel-slip problem. In 1953 New York Air Brake, collaborating with General Electric, started to develop pneumatic slip control which would have the necessary speed of brake application and, at the same time, be economical to install on new and existing locomotives. Tests were conducted first in the NYAB laboratory and, later, in the field, cooperating with General Electric which was then developing its 2,500-hp U25B (RL&C, March 1961, p 31).

The traditional method for correcting wheel slip on diesel-electric locomotives is reduction of power either manually or automatically. This will invariably decrease the train's speed. To control wheel slip without serious loss of tractive effort the pneumatic wheel-slip control makes a minimum brake application to restore the slipping pair of wheels to normal wheel-rail speed and then quickly releases.

When a locomotive axle slips, it accelerates to a high speed because it is then operating under less load than the axles which are not slipping. With pneumatic wheel-slip control, the brake is applied equally to all axles, taking maximum power from the slipping axle and minimum power from the others. This has little effect on engine output; when the slip is corrected and brake released, the locomotive is delivering full power. Locomotive speed is not materially affected. Only a light application is needed because the inertia forces involved are small. Such an application also reconditions wheel treads, improving adhesion.

The brake is applied in less than one-half second and, when the slip has been corrected and the speed of the slipping wheels returns to normal wheel-rail speed, the brake application is released in less than a second.

Experience has shown that it is preferable to make the brake application on all axles of a unit even though only one axle is slipping. For such an installation, only one control valve is required per unit, the most economical arrangement possible. When one axle starts to slip, the power it loses is transferred to the other non-slipping axles, thus increasing their tractive ef-



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fort and their tendency to slip. The application of the brakes to all the wheels tends to prevent the slipping of axles on which the tractive effort is increased, in addition to reducing the speed of the slipping axle.

The valve, designated as the wheel-slip controller, consists of a magnet valve portion and an adjustable limiting valve portion mounted on a common pipe bracket. The assembly is 9-1/16 in. long and 6-1/16 in. high. The basic application consists of one wheel-slip controller, one double check valve, and two J-1 relay valves. When wheel creep or slip is detected by the locomotive's slip sensing equipment, the magnet valve coil is energized, allowing main reservoir air to flow quickly through the adjustable limiting valve portion to the double check valve and then to the control pipe of the J-1 relay valve.

Because there are several different wheel-slip detection systems, wiring has to be tailored to the particular locomotive model on which an installation is made.

The adjustable limiting valve portion, set at about 15 psi, gives the fastest possible application by allowing control pressure for the relay valve to overshoot momentarily, fading quickly to the setting of the adjustable limiting valve. A surge of main reservoir air, corresponding to the control pressure, enters the brake cylinders to push the brake shoes against the wheels, overcoming inertia of the brake rigging. Calibration of the adjustable limiting valve portion cuts the surge of main reservoir air at approximately the instant brake shoes contact the wheel treads. Pressure then levels off and is controlled at the predetermined value. The brake system on each truck is fitted with a separate relay valve. One relay valve operates as a "slave" to the other. The first is actuated by control pressure from the wheel-slip controller, and the second is actuated by the main reservoir pressure from the first relay valve which is also transmitting air to the brake cylinders on the first truck.

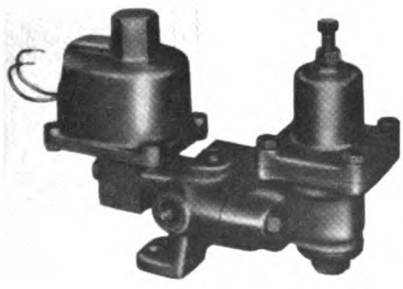
If a regular brake application is made while a wheel-slip controller application is in effect, and exceeds setting of adjustable limiting valve, shuttle valve in the double check valve will change position so the conventional air-brake system functions. When slipping stops, the detection system functions to de-energize the coil of the magnet valve, permitting air in the relay valve control pipe to exhaust rapidly through the open magnet valve portion. This causes a similar rapid exhaust of brake cylinder air through both relay valves.

On locomotives equipped with dynamic braking, circuits are arranged so the wheel slip controller is cut out when the unit is in dynamic braking.

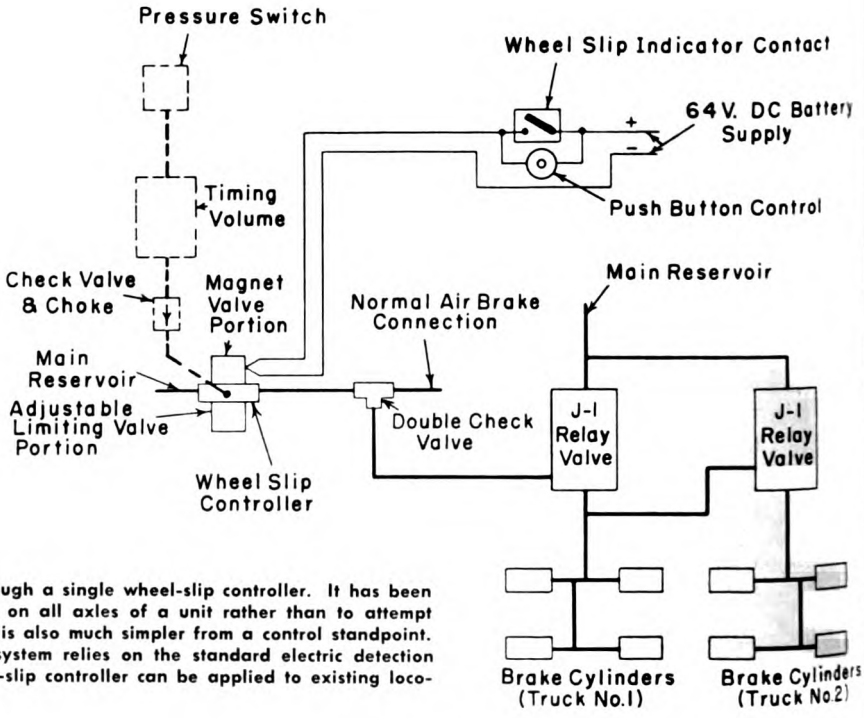
A pneumatic timing arrangement is used to initiate additional control actions when the slipping persists. A prompt brake application in response to a wheel slip signal will generally correct a wheel slip immediately and another wheel slip does not occur until another slippery spot on the rail is encountered. Long sections of bad rail may produce cycling of the pneumatic wheel-slip control. The timing circuit can be used to apply sand or reduce power to the traction motors when this cycling extends beyond a reasonable time. This additional equipment consists of a check valve, choke, timing reservoir, and pressure switch.

The pneumatic timing system on General Electric U25B locomotives, which were not tested on the GN, has the timing volume discharging continually through a small choke to atmosphere, building up a pressure to operate the pressure switch only if slip continues for three seconds. When slipping occurs, the wheel-slip controller is energized and excitation is slowly reduced simultaneously. If slipping continues for three seconds, sanding is initiated and the wheel-slip light and buzzer signal the operator that one unit is slipping. When the wheel slipping stops, sanding continues briefly after the brake application is released.

The NYAB pneumatic timing system on the GN's EMD units consists of a 40 psi spring loaded check valve and choke feeding the timing volume and pressure switch. The choke is calibrated to allow the timing reservoir pressure to build up to 60 psi if wheel slip continues for five seconds. When



Wheel slip controller is three-unit assembly consisting of a mounting bracket portion, an adjustable limiting valve portion, and a magnet valve portion. Overall length is 9-1/16 in. and the height is 5⅝ in.



All the brake cylinders on a unit are supplied through a single wheel-slip controller. It has been found most effective to make a brake application on all axles of a unit rather than to attempt to brake only the slipping axle. The arrangement is also much simpler from a control standpoint. For indications of slipping axles, the pneumatic system relies on the standard electric detection equipment. Great Northern has shown that wheel-slip controller can be applied to existing locomotives without complication.

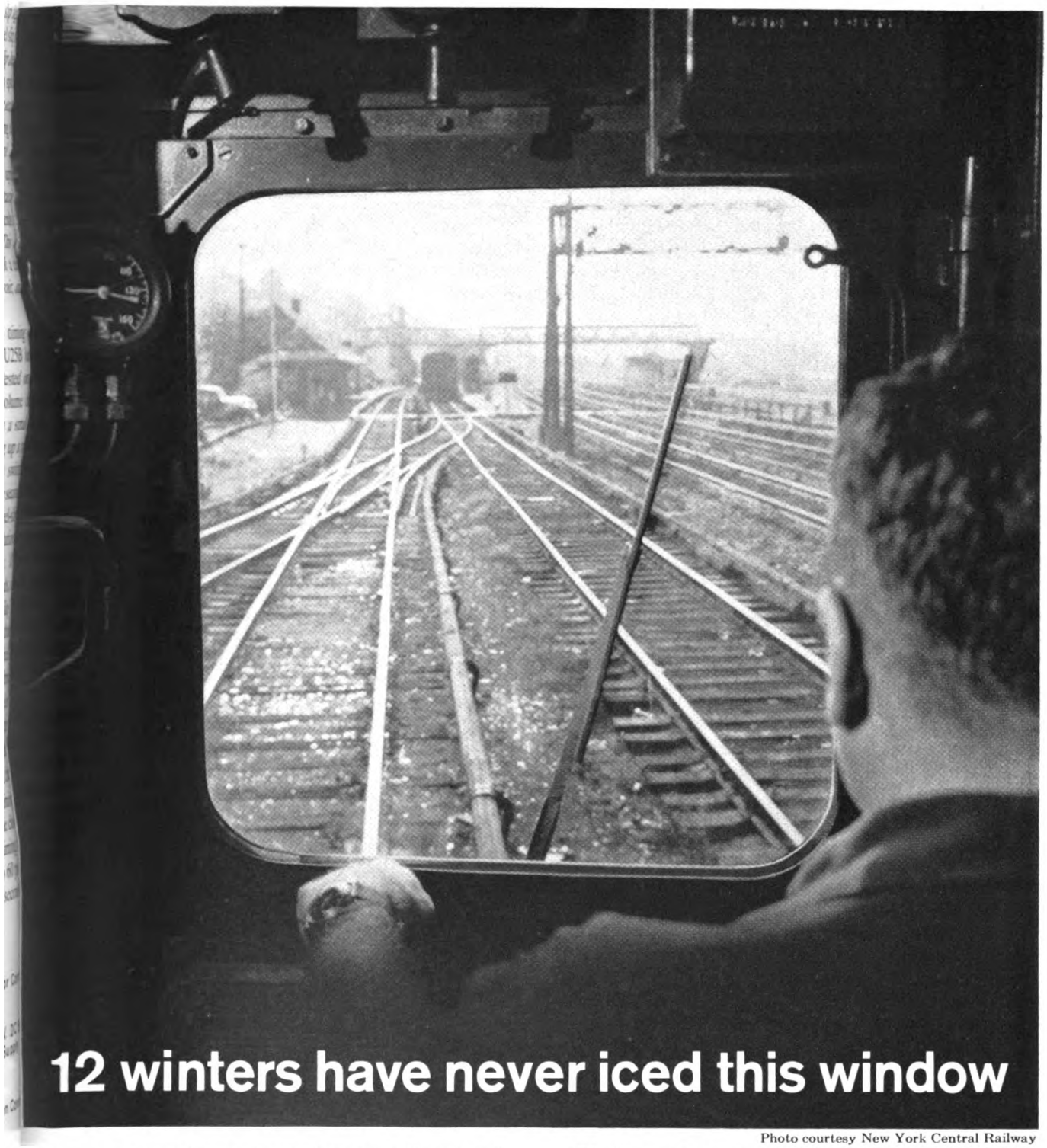


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wheel slip occurs, the wheel-slip controller is energized on the slipping unit, the wheel-slip light is actuated on all units and sanding is applied on all units for 10 seconds. If wheel slip continues for five seconds or intermittent slips occur frequently enough to build up the timing volume to 60 psi, the pressure switch opens, dropping the shunt field relay to open the shunt and battery field contractors and remove excitation from the main generator. When the shunt field relay opens, the wheel-slip controller is also de-energized, releasing the brake application. Pressure in the timing volume drops, allowing the pressure switch to close and picking up the shunt field relay so that the main generator is again excited. The entire cycle takes less than ten seconds.

The timing arrangement just described is the one applied to the three Great Northern GP-20 road locotives which have been used for testing. The wheel-slip controller on these units can be energized by the operation of any combination of the WCR, WS, WS13, or WS24 wheel-slip relays. In almost all cases, at least two of these detected the slip. Operation of the wheel-slip controllers was recorded during the tests by stroke counters installed on the locomotives. Other instrumentation showed operation of the four wheel-slip relays on each unit, operation of sanders, and indication of whether unit was in series or parallel transition.

Using the three locomotives, a 1,900-mile test run was made from Minneapolis, Minn., to Hillyard, just outside Spokane, Wash., and back to Havre, Mont. The three test units were coupled together and used as the lead units on several different trains. During this test a total of 285 wheel slips occurred—173 on the lead unit, 67 on the second unit, and 45 on the third unit. Wheel slips were corrected quickly in one to two seconds from the time of indication. During grade operation when frequent wheel slip actions were corrected, by the wheel-slip controller and automatic sanding, train speeds remained constant and tractive effort was continuous. Wheel slips corrected on one locomotive unit did not induce wheel slips on other units, as is the case with the standard wheel-slip correction where power is removed and reapplied.

"Under good rail conditions and maximum load, speeds of 17 mph. or lower, are within the range where slips are most likely to occur," the GN reported. "Automatic sanding is necessary for optimum results with wheel-slip correction systems. This was proved during the test by the cutting in and out of automatic sanding . . . Additional brake shoe wear from pneumatic wheel-slip control was found to be negligible."

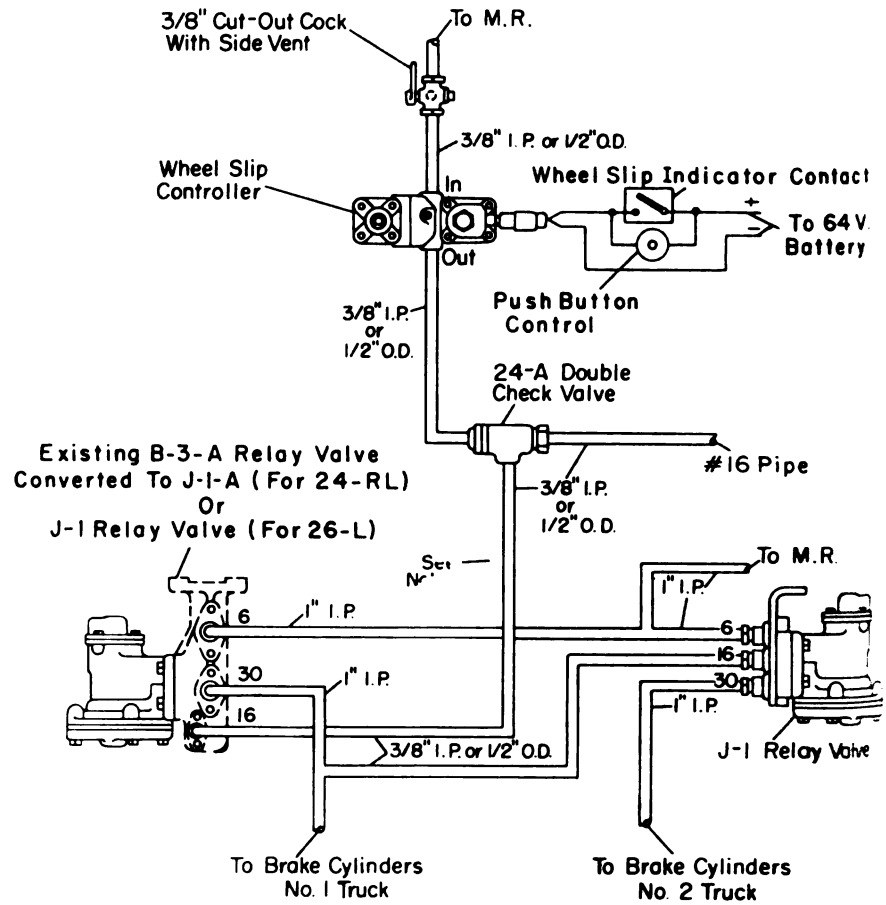
The original GN installation had been made four months earlier on one of these three units used in the multiple-unit test run. Observations were made on a 1,400-mile trip from Minneapolis to Hillyard with this locomotive used as the lead unit of a multiple-unit locomotive consist. Wheel slips were effectively corrected in 95% of the cases with automatic brake and sanding applications.

"With the exception of rail conditions between New Rockford [N.D.] and Minot [N.D.], Minot and Des Lacs [N.D.], and on passing tracks, rail conditions were good," it was reported. "During this single-unit test a total of 151 wheel-slip actions were noted on the unit with the wheel-slip controller. Corrections were made very quickly—in approximately one to two seconds in all but seven cases.

These seven wheel-slip actions were over five seconds' duration, and occurred at speeds of 35 to 60 mph. The removal and reapplication of excitation to the main generator was smooth and fast. The total time from the wheel-slip indication to reapplication of excitation was approximately ten seconds.

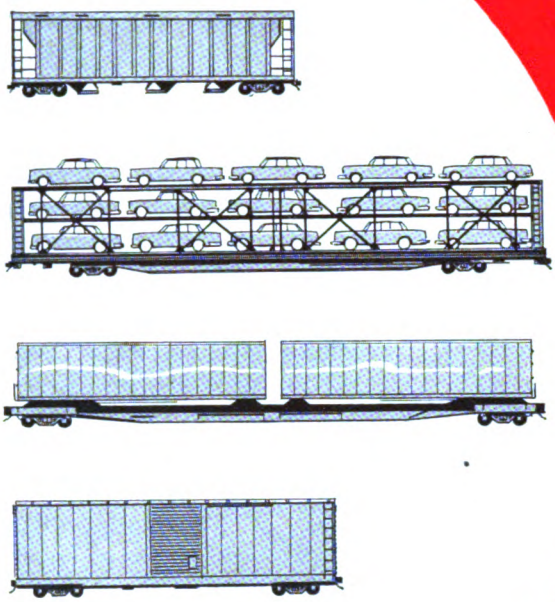
"In ascending a 13-mile grade on frosty rail, a total of 68 wheel-slip actions occurred which were quickly corrected. Power or excitation was never reduced either automatically or manually on this grade.

"Even under dry, good rail conditions, wheel slip occurred frequently on trailing units, particularly on relatively level track in the 40- to 60-mph speed range . . . From Havre to Hillyard, the unit with the wheel-slip controller experienced 23 automatic brake and sanding applications, while 73 automatic sanding operations and excitation removals occurred on the three trailing units."



Typical installation shows application of wheel slip control to locomotive with 24-RL brake including B-3-A relay valve, or with 26-L brake without F-1 selector valve. Broken lines indicate existing components. Pipe from controller to J-1 valve is not to be longer than 15 ft; the J-1 valves are to be as close as possible to the trucks they control.

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Doc Puts His Diesels on the Spot

By Gordon Taylor

There had been too many diesel failures; the mechanical department was greatly concerned. The preventive maintenance program did not seem very effective; something certainly had to be done to get maintenance back on the track. The diesel shop superintendent at Centerville called his supervisors together to discuss the problem. When the meeting opened, the superintendent said, "All of you know the purpose of this meeting. We are looking for ideas that will make our locomotive performance more dependable. Tell us exactly what you think is wrong and what should be done to correct it."

The first foreman spoke at length on the need for more men in the maintenance force. The next speaker said much the same in a roundabout way. He said maintainers needed more time for their work; that locomotives were called for service too soon.

"Our performance doesn't show up well when compared with our competitors, because they have newer model locomotives that don't require as much maintenance as ours," the third speaker began. "We should replace some of the older units."

"We're getting nowhere," the shop superintendent broke in. "I'm looking for someone to point the way to something we can do with what we have." Turning to Doc Watts, the electrical foreman, he asked, "What's on your mind, Doc?"

"What the last speaker said about the advantages of new locomotives gives me a springboard from which to jump into what I'm about to say," Doc replied. "The new units are much improved because the builders, learning from experience, have improved those parts causing trouble, or have eliminated them entirely.

"I'm wondering if railroads have benefitted as much as the builders from experience. If so, our experience should be pointing the way to better maintenance methods. We must be sure that everything we do needs doing, and that it gets done in the most efficient way.

"One of our most time-consuming operations is cleaning of parts and locomotives. It may be that new cleaning materials, or completely new methods should be given careful study. I believe that much of the time and labor spent in cleaning could be better spent in inspection and repairs. Here would be one way to get the extra help discussed earlier.

"Our past experience shows it's very difficult for supervisors to have a clear picture of the progress being made day by day in our preventive maintenance program. To a certain degree our diesels have us on the spot. I propose that we put our diesels on the 'spot.'

"This is an idea borrowed from the builders, and several roads are already using it," Doc continued. "Builders would get nowhere in assembling their locomotives if they tried to do all of the work in one place. Men would be in each other's way and much time would be lost as they interfered with one another.

"Several roads have set up 'spot' repair facilities for diesel maintenance and, from what I've learned, they are proving quite successful.

"The first step taken by most roads in establishing spot systems is to make detailed studies of their preventive maintenance schedules to see how the work can be divided into spot jobs—jobs that could be performed at one location with a minimum interference between men working at different tasks.

"It is necessary to plan these spot jobs so they can each be completed in the same length of time. All units on a line must be advanced to the next spot simultaneously. I know one road which aimed to complete each spot job ine one hour. When their study was complete, it was found that the number of units to be handled and the number of 'spots' which could be established would allow 70 min at each location, including the time for moving the line."

At this point one of the foremen spoke up and said, "How on earth do you move these units? They have to be shut down while work is being performed on them, don't they?"

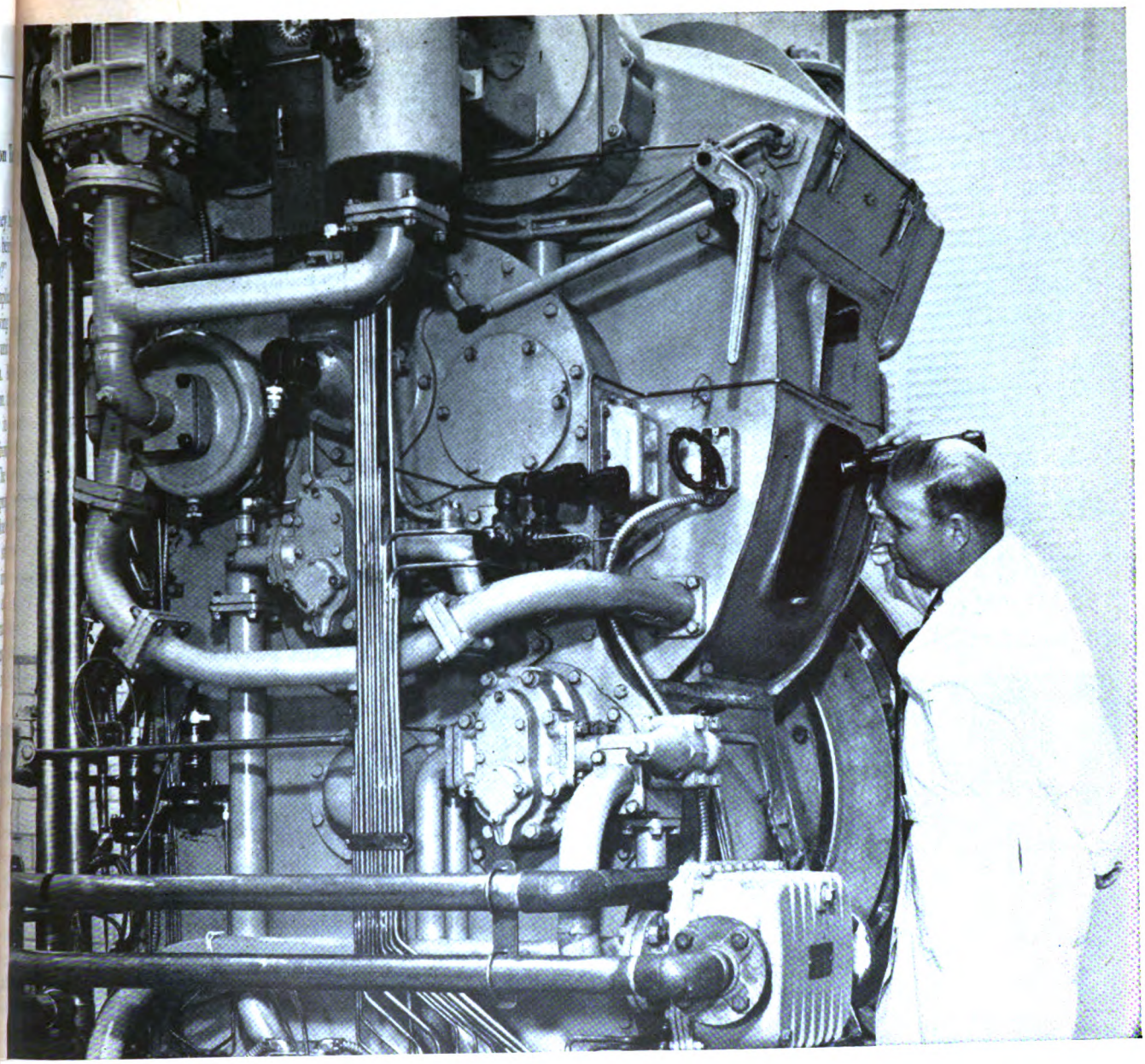
"It hasn't been too complicated," Doc replied. "All the moving along the line can be done by the unit coming into the No. 1 position. Before getting its inbound inspection, it can move into the shop under its own power, advancing all units from one work station to the next. The units are separated after being properly spotted, and the unit which does this can be returned to the No. 1 station where it is given a preliminary inspection before the engine is shut down. Another method is to power a traction motor on one unit from the battery on that unit. This unit can then move the line.

"The important thing about this spot program is that all units must be ready to be advanced at the same time. If something interferes with the program of the line of units through the shop, it is at once apparent and the lack of men or materials becomes a matter of first importance to supervisors. This plan automatically establishes production quotas for the maintenance forces. When you adopt this spot system for performing ICC inspections and preventive maintenance, it's much like taking a daily pledge to do promptly everything necessary to fill the requirements of the preventive maintenance program. It certainly doesn't encourage slipshod work either. Each man signs the work slips, acceptaing responsibility for the jobs assigned to him.

"Material and tool racks must be provided at each work location to keep the materials and tools for the operations performed there. Most railroads have found it expedient to set up a work area where components removed on a routine or emergency basis can be cleaned, rebuilt, or repaired to make them ready for reuse. Such a work area can be staffed by a group which is assigned to work on the progressive line when a unit is found to require emergency repairs. They may also work on units due for semi-annual or annual ICC inspections."

(Continued on page 44)

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.



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At this point one of the foremen spoke up. "It must require a rather large force of men to handle a series of spot repair stations. Doc, can you tell us about that?"

"You will probably be surprised," said Doc, "but one seven-station shop facility that I have read about has a regular force of 22 men to cover all stations. Seven units are processed through this line in 8 hr. Having the tools and materials needed at each spot location reduces non-productive time to a minimum.

"One chief mechanical officer recently described his spot maintenance system as 'the most significant advancement in the mechanical department since diselization.' A statement like that should be food for thought for all of us.

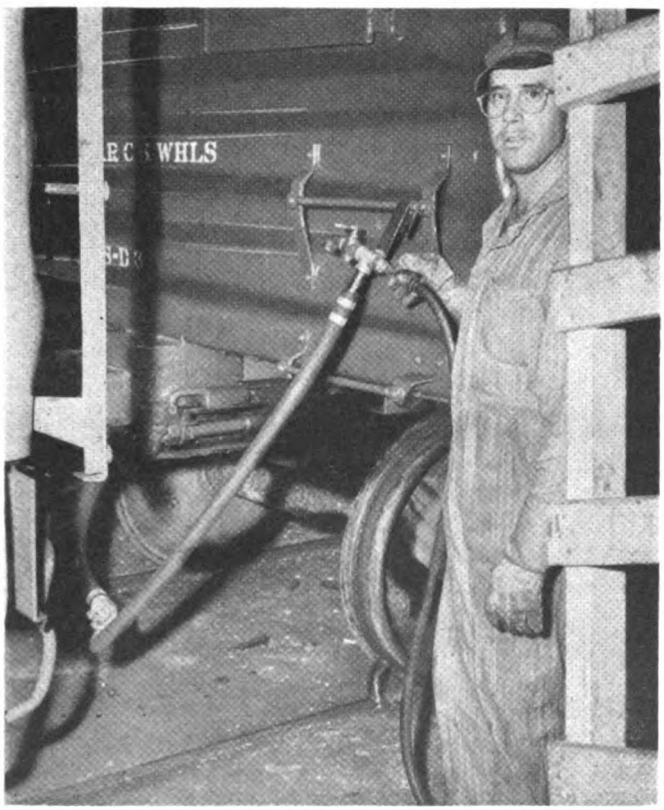
"Now, Doc continued, "this setting up of spot repair facilities is a big undertaking, but it pays off. We may not be able to establish a complete spot line immediately, but it gives us a goal. If spot or progressive line methods enable builders to build locomotives at the lowest cost, it would seem we should follow similar procedures in the maintenance of those units."

"In any case, I believe we should immediately investigate the possibility of improving our diesel cleaning procedures. Improved materials and new methods should produce worth while savings. Labor used in cleaning could better be spent on inspection and repair."

"Doc," said the superintendent, "you've given us much to think about. I'm glad you have passed on to us the ideas gleaned from your reading and study. Spot maintenance for our diesels may be just what is needed to take our diesel maintenance force off the spot."

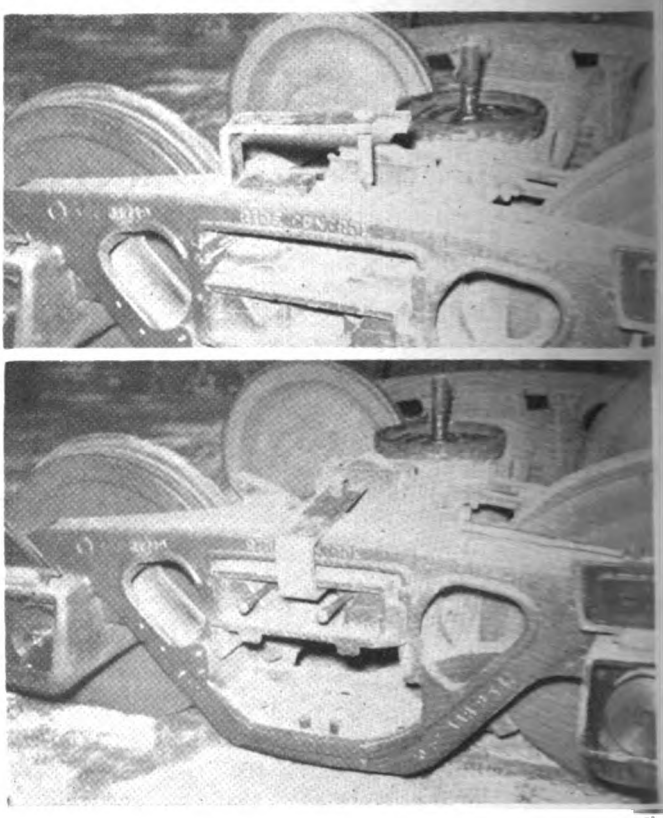
Car Repair Time Savers

Car Control



This control unit was developed at a car builder's plant for stopping cars at the air-test position on the shipping track. It makes it possible to walk alongside of cars rather than between them as they are being pulled or pushed, eliminating the possibility of injury when stepping between moving cars to separate hoses. The device consists of a ¾-in. hose with a car coupling on one end. The other end has a ½-in. fitting, a tee and valve. When coupled to the car and shop air applied at tee, the valve is opened and car can be stopped where desired.

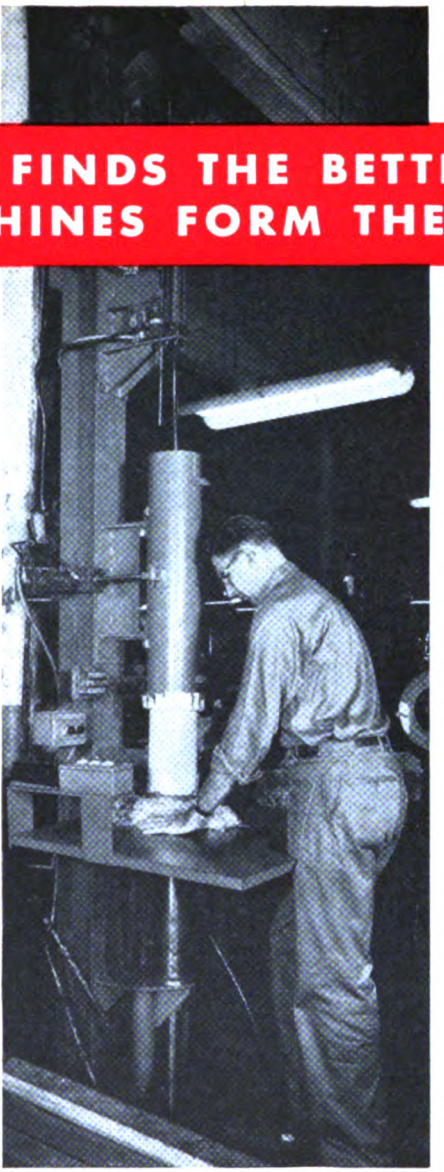
Bolster Clamp

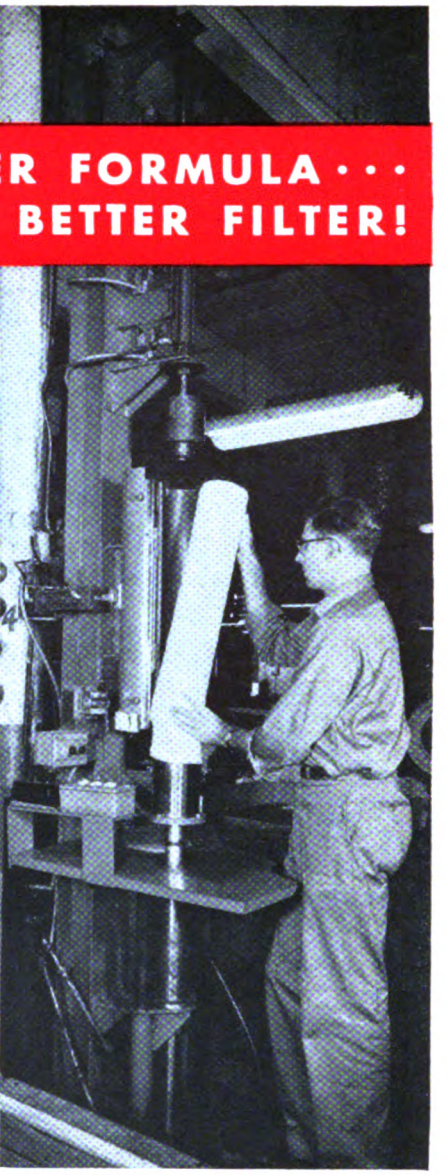


Bolster clamp, developed by the Duluth, Missabe & Iron Range, is used at the Proctor, Minn., car shop to hold side-frame truck bolster in place while changing springs or welding friction plates. The J-shaped clamp is made of ¾ - x 3½-in. steel bar, has a 17-in. top leg, a 6½-in. lower leg, and is 6 in. across. It weighs 20 lb. The clamp is fixed in position by a 1-in. diameter pin extending through top leg and down behind side frame. Use of the clamp makes a safer job and releases the shop's overhead crane for other operations.

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WIX Series 4LM, 4129, 12700, 12800 and 12900M are now packed by the controlled density method.

WIX has advanced the filtration of Diesel Fuel and Lubricating Oil a giant step with filter cartridges wherein precise control of weight, density and dimensions provide an entirely new standard of performance. These new WIX cartridges represent an important contribution to operating economy and preventive maintenance. This family of advanced type cartridges is now available for all your diesel locomotives. Get the facts today!

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Please send us full information on your controlled density Filter Cartridges.

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Keeping injector nozzles clean is one of the most difficult diesel engine maintenance problems. Carbon deposits and fuel oil varnishes cause the injector needle to stick tight . . . almost impossible to remove without damage to the needle.

Now the injector needle can be easily removed and both parts cleaned . . . if you **Lix it!** A few hours soaking in Lix Cleaner Number 401 removes all carbon varnish and grit deposits . . . leaves all surfaces as clean as new.

Without brushing or scraping, Lix soak-type cleaners **soak away** accumulated grime from pistons, liners, heads, injectors and lube-oil coolers, without damage to vital parts. All metals can be cleaned in the same tank, at the same time. Lix rinses away with water or mineral spirits and leaves no granular deposits—reduces after-rusting. Safe to use, Lix cleaners are low in toxicity and are not fire hazards.

Lix cleaners cost less to use than even the so-called "economy" cleaners. Lix lasts longer and requires less frequent charges.

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(3138)



What's New

(Continued from page 9)



nozzles float freely as a plate riding wheel moves over the work surface, maintaining the proper nozzle-to-workpiece distance regardless of surface contours which could cause irregular cuts. When nearing the end of a cut, the free floating feature can be locked out so that torch nozzles will not drop onto the work as the wheel moves off the edge of the plate. To simplify nozzle cleaning, it can also be locked at a 45-to 90-deg angle. The unit can be mounted on a flame-planer type bridge, Linde CM-48 side-beam carriage, or the Linde CM-37 portable machine carriage. The PE-1 attachment is 45 in. high, including torches and nozzles; has a 20-in. wide base, and weighs approximately 111 lb. *Oxweld Railroad Dept., Linde Co., Division of Union Carbide Corp., Dept. RLC, 270 Park ave., New York 17.*



Lubrication Kit

The PM-506-8 lubrication kit includes pump, meter, and hose. The Prime-Alemite roller bearing lubricator features the Prime-PM-412 meter which provides a positive measure quantity of lubricant (in oz) to

(Continued from pag

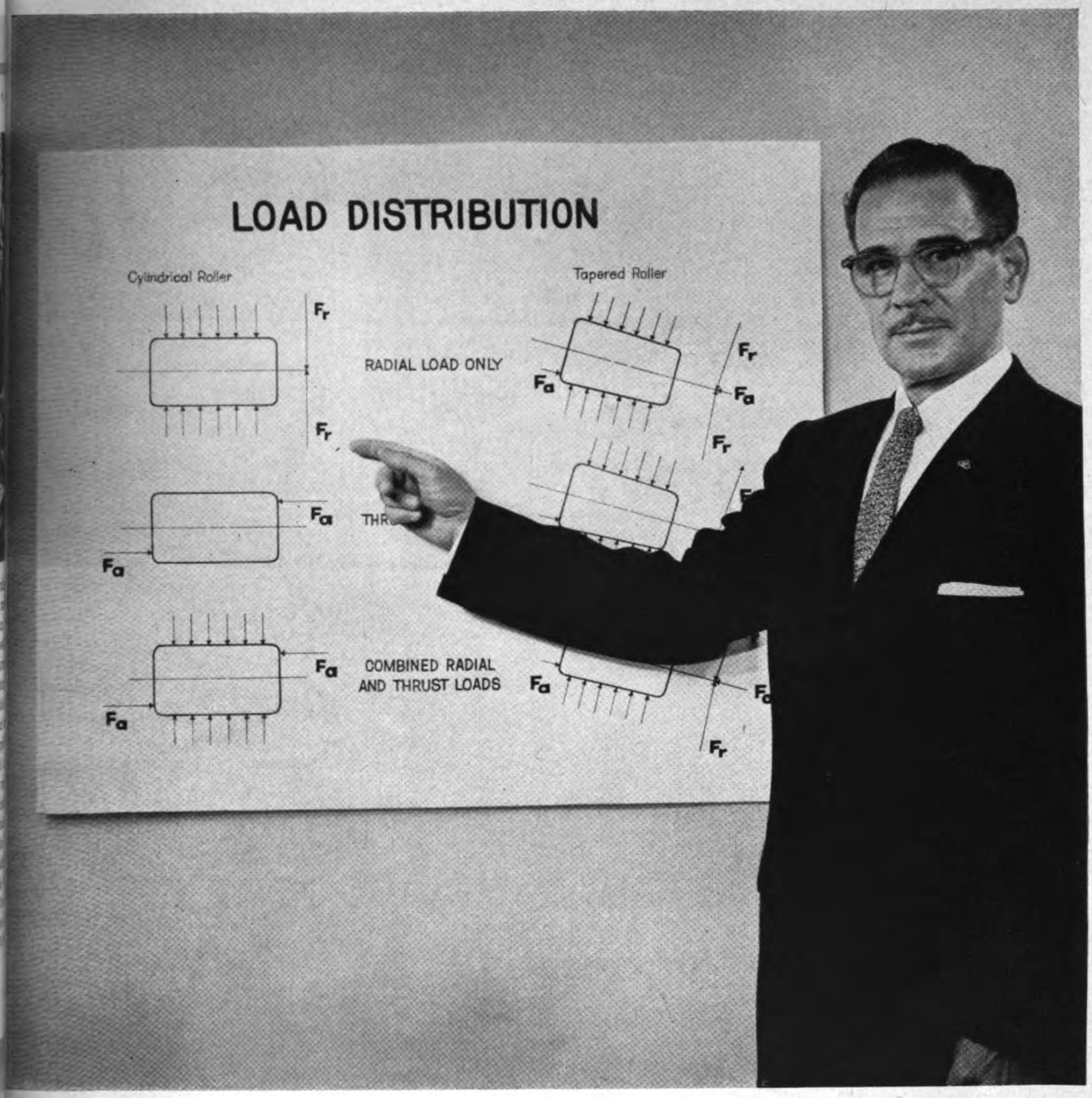


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M-412 meter which
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George Goodloe, SKF® *Railway Sales Engineer, tells . . .*

"Why cylindrical roller bearings are the right choice for freight cars

"Under radial load, the forces on a cylindrical roller directly oppose each other . . . with a tapered roller, radial load produces a thrust reaction that must be resisted at the roller head.

"Under thrust load, the cylindrical roller is loaded only on the ends . . . the tapered roller under thrust load causes an increased radial load reaction.

"Under combined radial-thrust load, the cylindrical roller is superior where the radial load predominates . . . and journal loads are predominately radial in direction.

"Size for size, material for material, workmanship for workmanship, it is an accepted engineering fact that the cylindrical roller offers greater capacities."

You can get more details on why cylindrical roller bearings are right for freight cars by calling the SKF Railway Sales Engineer in your area, or write: SKF Industries, Inc., Front Street and Erie Avenue, P. O. Box 6731, Philadelphia 32, Pa.

6119

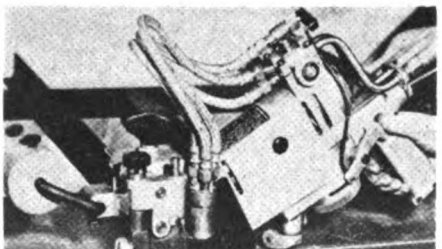
SKF MOTION ENGINEERING

Advanced ball and roller bearing technology

journal boxes. Two meter models are available—the PM-412-4 calibrated from zero to 4 oz, and the PM-412-8 calibrated from zero to 8 oz. The meter can be pump mounted. *Prime Manufacturing Co., Dept. RLC, 1669 South First st., Milwaukee, Wis.*

Flame-Cutting Machine

Fast, clean cuts in metals ranging in thickness from light gage sheet to 2 in. thick, it is said, can be made with the CM-75 Cadet, a 19-lb flame cutting machine. A clutch allows instantaneous free-wheeling control, making the machine suitable for hand-guided contour cutting. Straight-line cutting, bevel cutting, circle cutting, and some contour cutting can also be handled. The



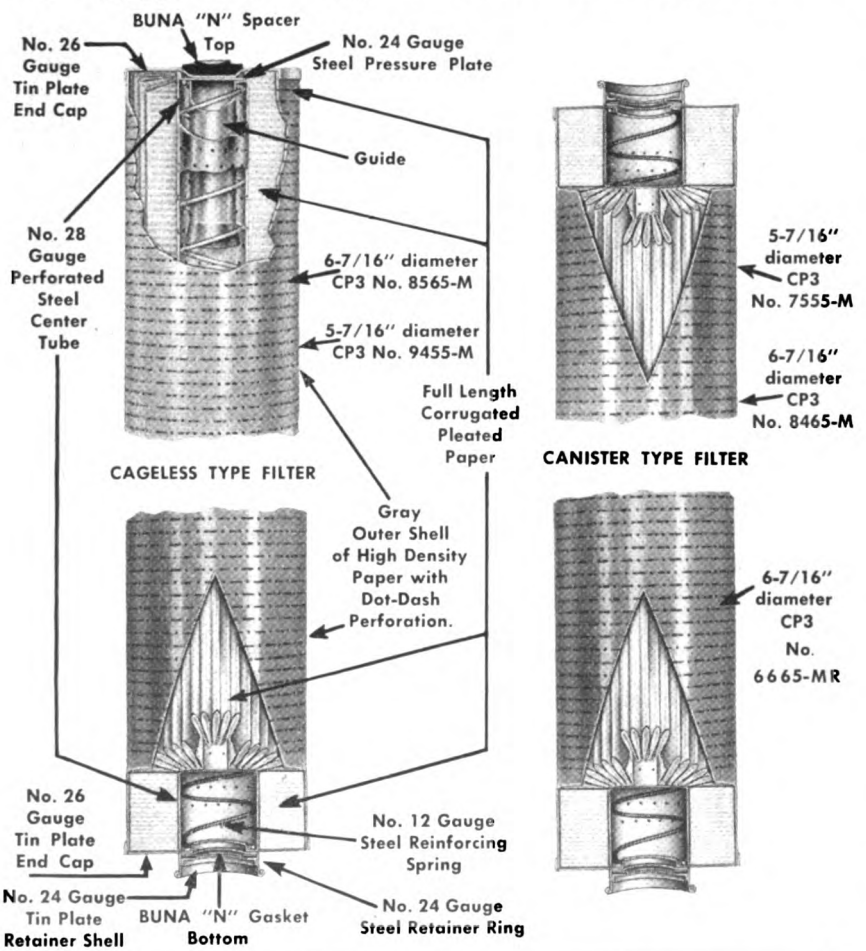
machine operates at speeds up to 30 ipm and can be used with acetylene, propane, or natural gas. *Linde Co., Division of Union Carbide Corp., 270 Park ave., New York 17.*

Protective Coating

After 14 months in service hauling coal fo the Berwind-White Coal Mining Co., a hop per car coated with Lipoxy, a compoun containing a Thiokol LP liquid polymer was said to be in good condition, with a estimated 97% of the coating in perfec condition. The compound, formulated b the Cosden Paint Co., is applied by spra or brush and cures at room or elevate temperatures. It is dry to the touch in hr; can be handled in 90 min, and over coated in 1½ to 3 hr. *Thiokol Chemica Corp., Dept. RLC, Trenton, N. J.*

SUPERIOR DIESEL FILTER CO.





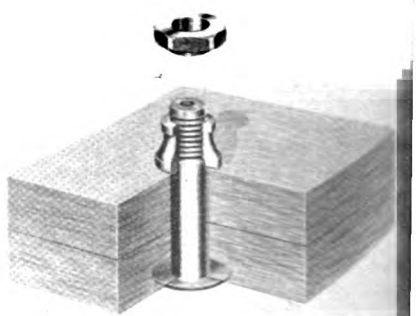
COMPLETE LINE OF DIESEL FILTERS	
Roving Type	Fuel Oil
Sock Type	Fuel and Lube Oil for use with or without Canister
Pleated Paper Type	Lube Oil for use with or without Canister

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Originators of Original Sock Type Filter
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Representatives in All Principal Cities



Heat Generator

A direct-fired heat generator complements the Herman Nelson De Luxe and Utility portable heaters. It was developed for sites where quick space heating and volume air circulation is a necessity, and is available in two sizes with Btu output ranging from 125,000 to 300,000. *American Air Filter Co., Dept. RLC, Louisville 8, Ky.*



Threaded Fastener

The Hi-Lok is described as a threaded fastener which combines the best advantages of a nut and bolt with those of a rivet. It includes a threaded pin and a self-locking threaded collar with its torque-off wrenching device. When the assembly of the collar and pin is completed, the wrenching device is automatically torqued off at the predetermined design load consistent within plus or minus 10%, regardless of fastener size. The device can be installed in tight clearance areas, as well as open areas because of the 90-deg tooling approach to the fastener during assembly. *Hi-Shear Corp., Dept. RLC, Torrance, Calif.*

ylon Air Hose

compression elbow fitting and a special on-slip" aluminum ferrule are supplied h Nycoil, a nylon air hose that stretches d recoils like a telephone cord. Air flow nobstructed. The hose can be connected any straight or pistol-type air tool, or to uipment requiring air pressure up to 200 . It is available in standard 25 ft lenghts th positive-lock full flow fittings on each d. *Nycoil Co., Dept. RLC, Westfield 4, J.*

upply Trade Notes

USSELL, BURDSALL & WARD BOLT NUT CO.—The *Fastening Service Center Kansas City, Inc.*, an RB&W subsidiary, s been opened in Kansas City where ma- r U.S. brands of industrial fasteners— SNA elastic stop nuts and roll pins, Pop ivets from United Shoe Machinery, Mac- ean-Fogg lock nuts, etc., as well as the mplete RB&W line—will be available.

■

YANDOTTE CHEMICALS OF CANDA LTD., J. B. FORD DIVISION.—*Terence eill*, Wyandotte's Canadian sales manager, ected a director and named director of ıles of this Wyandotte subsidiary. New lant at 41 Metropolitan Road, Scarborugh, Ont., has facilities for manufacturing ll types of products, both dry and liquid, nd laboratory facilities for testing all raw ıaterials and finished products.

■

VERSON ELECTRIC CO. — *John S. Iskey* appointed engineering manager of verson Electric of Allentown, Pa.

■

OODYEAR TIRE & RUBBER CO.— ontracts completed with *Moon Welding & Iachine Corp.*, Kokomo, Ind.; *Chemical roof Corp.*, Seattle, Wash., and *Standard ubber Co.*, San Francisco and San Jose, alif., for application and repair work on lioweld and Trioweld lining materials for ank cars.

■

EYSTONE RAILWAY EQUIPMENT O.—*Fred M. Groff* appointed sales manger. Mr. Groff formerly eastern district ales manager, Stran Steel Corp.

■

AILWAY MAINTENANCE CORP.— *Richard E. Franklin* elected vice-president n charge of manufacturing, engineering, nd spot car repair systems.

■

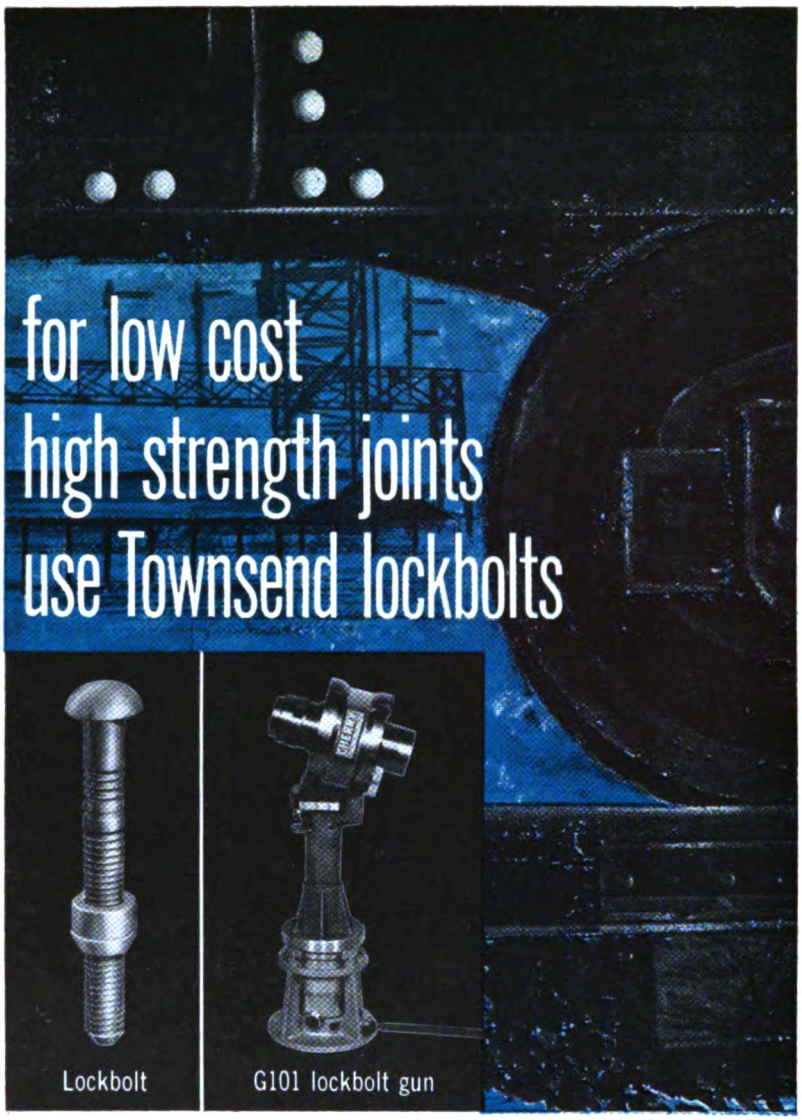
WESTINGHOUSE AIR BRAKE CO.—*W. C. Landis*, vice-president and general manager, Air Brake Division, retired.

■

ARTNELL CO.—Artnell of Chicago has purchased *National Seating Co.* of Mansfield, Ohio, manufacturer of transportation seating. *R. G. Brooks*, president of National Seating, and *Dan Cross*, vice president-sales, continue in those capacities.

■

AMERICAN STEEL FOUNDRIES. — ASF plans to change its corporate name to *Amsted Industries, Inc.* Change subject to stockholders' approval at January 23 annual meeting. To preserve the "substantial com-



New car builders and repair shops get uniform, vibration-proof, secure joints at low installed cost with Townsend lockbolts.*

Townsend lockbolts are easy to install with a 2 or 3 man crew. Ordinary type fasteners require larger, more costly, highly specialized crews. Increased driving speed and the elimination of fitting-up operations step-up production. Worker fatigue is minimized.

A demonstration—in your office or on the production line—can be easily arranged. Our field engineer will demonstrate the practical and long lasting benefits of Townsend lockbolts. Write Townsend Company, Engineered Fasteners Division, P. O. Box 71-RR, Ellwood City, Pennsylvania.

*Licensed under Huck patents RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049; and 2,754,703.

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This 45 page handbook is a manual of modern railroad cleaning methods. Covers everything from dining car dish washing to diesel engine block overhauling.

CLEANING EQUIPMENT HANDBOOK

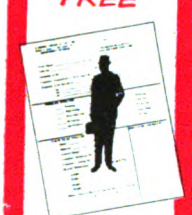
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This 32 page manual covers basic cleaning from the selection of chemicals to equipment and methods, presenting over 100 types of equipment and cleaning techniques.

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- ☐ Cleaning Handbook
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City _____ State _____

mercial value" of the 60-year-old ASF name, the Transportation Equipment and Hammond Division to be operated as American Steel Foundries, Inc.

■

AMERICAN BRAKE SHOE CO.—Railroad Products Division plans to spend $2,500,000 to convert its Toledo, Ohio, cast-iron freight-car-wheel foundry to the production of its "Southern" cast-steel wheel. Plant, when completed late in 1962, to be capable of producing 45,000 wheels annually.

■

ADAMS & WESTLAKE CO.—Adlake has purchased the *Loeffelholz Co.*, Milwaukee, Wis. *Nicholas J. Nowicki* of Loeffelholz engineering and sales staff, has been retained by Adlake's Transportation Division and will operate from Chicago sales office.

■

LEWIS BOLT & NUT CO.—*Modern Supply Co.*, 222 West Adams st., Chicago 6; *Robert E. Mann*, and *Earle A. Mann* appointed manufacturers representatives.

■

OAKITE PRODUCTS, INC.—*Donald F. Moulton* appointed technical service representative in Vermont.

■

YOUNGSTOWN STEEL CAR CORP.—Operations of Youngstown Steel Car have ceased.

■

SCULLIN STEEL CO.—*William J. Ennis* appointed district sales manager, Chicago area.

■

ELECTRIC STORAGE BATTERY CO., EXIDE INDUSTRIAL MARKETING DIVISION.—*Charles A. Taylor*, manager, Washington district, appointed manager, southeast region, Washington, D.C., succeeding *J. A. Klingensmith*, retired.

■

AEROQUIP CORP.—*O. L. Adkins* appointed products manager, railroad sales, Jackson, Mich.

■

UNION TANK CAR CO.—Offices formerly at 228 N. LaSalle, Chicago, now in Union Tank Car Building, 111 West Jackson Blvd., Chicago 4.

■

COLORADO FUEL & IRON CORP.—*Leonard C. Ross*, executive vice-president, elected president and director, succeeding *Alwin F. Franz*, now chairman of the board. *W. W. Leonard* appointed manager, tubular sales, Western division. *D. W. Kelly* named assistant to manager, tubular sales.

■

VAPOR CORP.—Vapor has acquired business and assets of the *Transit Division of National Pneumatic Co., Inc.* Company will become National Pneumatic Division of Vapor Corporation.

■

HENSCHEL-WERKE.—*Henschel-Werke*, Gm.b.H. of Kassel, West Germany, entering American market with a 4,000-hp diesel hydraulic locomotive. Company to be converted into a publicly held corporation on January 1, 1962, with a group of U.S. investors holding 44% of capital stock.

OBITUARY

ELMER C. WRAUSMANN, vice-president-sales, St. Louis Car Co., died November 8.

Freight and Passenger Car Charts

These charts are very helpful to AAR billing clerks, mechanical engineers, purchasing and stores personnel, car inspectors, write-up men, car foremen, and anyone else who needs a knowledge of car parts and their relation to each other.

The charts include a cutaway diagram of the car and a listing of important parts with arrows showing where the part is located. These charts are a part of standard training programs used on a number of major railroads.

$2 each
$10 for any six

If you are not satisfied
YOUR MONEY WILL BE REFUNDED
if you return the charts to us within 30 days.

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Please send the charts I have checked below. If I am not satisfied I will return the charts within 30 days for a full refund. I enclose a check or money order for $2.00 for each chart or $10.00 for any six charts.

- ☐ Streamlined light weight passenger car (16x25 inches)
- ☐ Covered hopper car (22x30 inches)
- ☐ Box car, AAR standard 40 ft. (23x25 inches)
- ☐ Air conditioned chair car, 1930 design (18x35 inches)
- ☐ Tank Car (22x35 inches)
- ☐ Refrigerator Car, wood sheathed, steel underframe, 1920 design (14x20 inches)

12/61

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Address _____

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Job _____ RR _____

Here's the *latest* equipment for

Precision NOZZLE RECONDITIONING

It's from Hartridge, naturally! Three new units to permit *complete* nozzle service work with lowest investment. Yet units are so advanced that they are a necessity for the modern Diesel service shop, or the O.E.M. Write or call today for complete information!



HARTRIDGE NOZZLE MICROSCOPE
Designed for quick, close inspection of all standard nozzle needle and body seats by reflected light. Eliminates time spent trying to recondition worthless nozzles and trial testing.

HARTRIDGE NOZZLE MULTICLEAN
Combines oil and air cleaning in a double flushing operation. Accommodates all nozzles from the small, popular type to large marine sizes. Illuminated magnifying glass for close inspection of spray holes.

HARTRIDGE NOZZLE RAPIDLAP
Provides a high-speed seat lapping process with Hartridge laps and lapping compound. Ideal for polishing precision injection parts. Dual spindles give two lapping speeds. Quick-action, key-less chucks. Swivels on base. Chuck head moves to three positions.

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Whether you need spray painting equipment, cleaning equipment, roller bearing packers, extrusion equipment or sealers and caulking compounds, or other heavy duty maintenance equipment . . . Graco has the answer!

For complete details, write or call your Graco Railway Representative today!

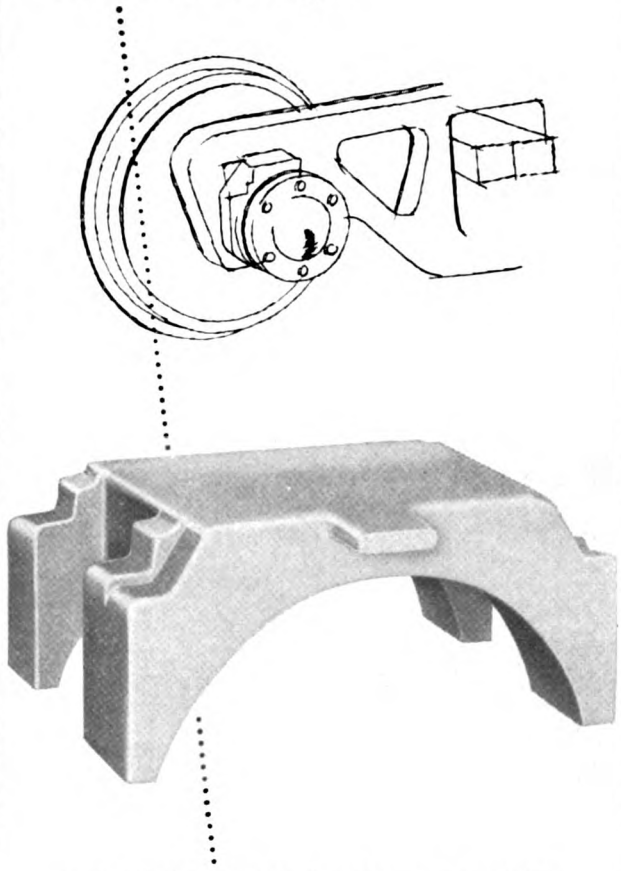
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- Special Adapters for AAR Wide Jaw Pedestal Side Frames.

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HELPS FROM MANUFACTURERS

LOCKNUT APPLICATIONS. Bulletin 6114 shows current self-locking nut installations on locomotives, freight cars, and passenger equipment. (Write: *Elastic Stop Nut Corp. of America*, Dept. RLC, 2330 Vauxhall Road, Union, N.J.).

■

CORROSION RESISTANCE OF STEELS. 60-page booklet, describes "The Role of Molybdenum and Copper in Corrosion Resistant Steels and Alloys." (Write: *Climax Molybdenum Co., a division of American Metal Climax, Inc.*, Dept. RLC, 1270 Avenue of the Americas, New York 20.)

■

WELDING WIRES AND RODS. Catalog F-1486 describes various Oxweld electric welding wires and rods for all continuously fed electrode welding processes. Details recommended welding processes and Oxweld wires and rods to meet various AISI, AMS, ASME, and AWS (ASTM), specifications for electric welding of aluminum; copper; aluminum-, phosphor- and silicon-bronze; carbon steel; stainless and alloy steels. (Write: *Linde Co.*, Dept. RLC, 270 Park ave., New York 17.)

■

INNERSHIELD WELDING. Bulletin No. 5300.1 describes vapor-shielded arc welding and new semi-automatic Innershield Squirt and full automatic Innershield welders. Illustrates typical applications and compares performance characteristics and process speeds with manual shielded metal arc and semi and full automatic submerged arc welding. (Write: *Lincoln Electric Co.*, Dept. RLC, Cleveland 17, Ohio.)

■

TRANSPORTATION FINISHES. 4-page folder lists and describes coatings for "every railroad requirement." (Write: *DeSoto Chemical Coatings, Inc.*, Dept RLC, Chicago, Ill.)

■

TRUCK SPRING TESTING MACHINE. Bulletin AD-124 details advantages of new truck spring testing machine developed by the spring industry and the AAR Condemning Limit Program. (Write: *Duff-Norton Co.*, Dept. RLC, Four Gateway Center, Pittsburgh 22, Pa.)

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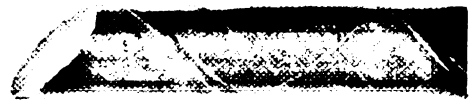
ELECTRIC HEATING ELEMENTS. Bulletin No. 600 describes heating elements—immersion, cartridge, strip, tubular, finned tubular, and infra-red—in capacities up to 600 volts for service in chemical, railroad, and other industries. (Write: *Heatrex, Inc.*, Dept. RLC, 1272 South Main st., Meadville, Pa.)

■

PRESSURE-TREATED WOOD. Technical Bulletin W-392 describes physical properties and tests of Cellon, a newly developed pressure treating process for the preservation of lumber and plywood for applications where decay and termite-resistant material is needed. (Write: *Wood Preserving Division, Koppers Co.*, Dept. RLC, 750 Koppers Building, Pittsburgh 19, Pa.)



Pinpoint Lubrication



with Nalco®

"MOLY STICKS"

Continuous Lubrication—Where You Need It
Can Triple Wheel Life—Lower Maintenance Costs Drastically

Nalco "Moly Sticks" offer railroads durable, continuous flange lubrication exactly where needed, in the precise amounts required. Long-lasting "Moly Sticks", made of tough molybdenum disulfide, give up to 6,000 miles per stick of wheel-protecting lubrication.

Dry "Moly Stick" lubricant won't creep under pressure, nor will it pick up the brake shoe dust and sand that turn grease type lubricants into destructively efficient abrasive compounds.

"Moly Stick" efficiency in keeping wheel flanges lubricated is performance proved—in some cases, wheel life has been increased as much as 300 per cent. This increased wheel life means fewer wheel turnings and substantially reduced maintenance and labor costs.

Installation and maintenance of "Moly Stick" lubricators are far simpler than "wet" lubrication systems. A diesel locomotive can be completely equipped with "Moly Stick" lubricators in less than one man-day. After installation, lubricant stick level is easily checked visually and "Moly Sticks" replaced as needed without tools or special equipment.

For details about "Moly Sticks" and Nalco Flange Lubricators, call your local Nalco Representative, or, write directly to:

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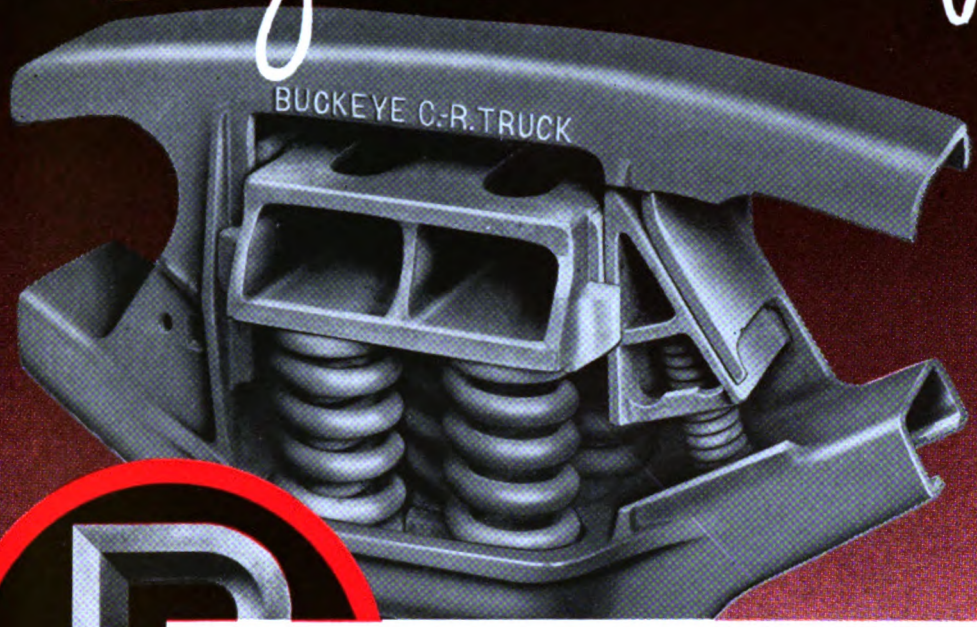
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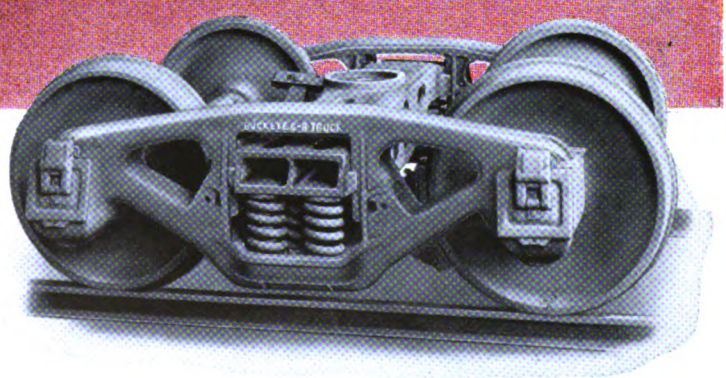
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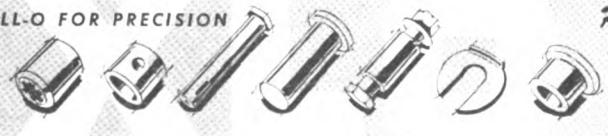
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